KANSAS STATE AGRICULTURAL COLLEGE
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Veterinary Medicine

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TULAREMIA MAY BE TRANSMITTED TO MAN

The epizootic disease known as tularemia, "rabbit fever," or "deer-fly fever," which kills off wild rabbits in great numbers, may also be transmitted to human beings through the bite of blood-sucking flies and ticks and through handling or coming in touch with the blood and internal organs of infected wild rabbits, according to investigations of the United States Public Health Service, and the Biological Survey of the United States Department of Agriculture calls attention to the prevalence of tularemia in order that, to prevent possible infection, persons exposed to the disease may observe precautions, such as wearing rubber gloves, rinsing the hands in antiseptic solutions after handling wild rabbits, and treating insect bites promptly with iodine. Many persons have become infected by dressing wild rabbits for the table or by cutting them up for fish bait or feed for poultry, swine, or other domestic stock.

Cases of the disease have occurred in Arizona, California, Colorado, the District of Columbia, Georgia, Idaho, Indiana, Iowa, Kansas, Mississippi, Missouri, Montana, New Mexico, North Carolina, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Utah, Virginia, West Virginia, and Wyoming. This distribution indicates that the disease probably occurs throughout the United States and that its recognition and occurrence in other States will be only a matter of time, as it was found in nine new States during the past year.

Tularemia is carried by jack rabbits, snowshoe rabbits, and cottontails and also by certain species of ground squirrels. In human beings the usual symptoms are headaches, chills, bodily pains, vomiting, prostration, and fever, followed by painful swelling and later suppuration of glands. It is a disabling disease, incapacitating the patient for weeks or months and at times terminating fatally.

The control measures being directed by the Biological Survey against wild rabbits and other rodents in the Western States for the protection of forage and other crops are not only accomplishing this object but also are safeguarding human health by checking the occurrence of tularemia.

A BOOST FOR THE VETERINARIAN

The following editorial appeared in the Poland China Journal under the caption "We Owe Much to Veterinarians:"

"Few of us realize the great good veterinarians do in the promotion of human welfare. We think of them only as students of affections of dumb animals and forget that as a secondary result of their work human life is lengthened and the human body made safer from the ravages of disease.

"We all know that numerous human ailments, notably yellow fever and malaria, are insect born and think no farther. As a matter of fact, however, the basis for this discovery is found in the experiments of a veterinarian who, in 1899, conclusively proved that Texas cattle fever virus was transmitted from animal to animal by means of the cattle fever tick.

"We all know that tuberculosis is one of the scourges of the human race, yet many of us overlook the fact that it frequently has its origin in the milk of diseased cows and that one of the big battles veterinarians now have on their hands is the eradication of tuberculosis in cattle, swine and poultry.

"Veterinarians stand on guard at the centers of animal slaughter, inspecting the carcasses which pass before them and condemning those which are unfit for human consumption. During the year ending June 30, 1924, they inspected the carcasses of almost 80,000,000 animals intended for food purposes.

"Truly we owe much to veterinary science. It is well for us to pause occasionally and consider this."

PLAN ACTIVE SEASON FOR CATTLE TICK ERADICATION

Federal, State and County forces are restricting the cattle tick to a gradually diminishing area in the South. During the active tick-eradication season, beginning in March and continuing to December, special attention will be given this year to completing the work in Virginia and South Carolina. The infested areas in these states are limited to three counties in Virginia and two in South Carolina. The success anticipated in these states will leave the Atlantic Coast States free down to the north line of Florida.

Since Georgia has completed tick eradication and has been experiencing more or less annoyance from ticky cattle in Florida, there has been constructed along the Florida-Georgia State Line two parallel wire fences for approximately 200 miles. It is not thought this protective measure will be necessary for long, as Florida eradicated ticks from approximately 7 counties last year. As a further demonstration the people of Florida have taken up systematic dipping in the remainder of what is known as Western Florida. Here a concerted drive in two "zones" has been arranged with the State of Alabama, and by the close of the year cattle ticks there should be a matter of history.

Alabama has succeeded in restricting the remaining ticks to a few counties in the southern part of the state, and it is expected the present drive will finish the work.

In Mississippi active eradication awaits action by the legislature. A revision of the present law and a liberal appropriation are now under consideration. If favorable action is taken, a number of counties are to be selected as a zone in which the dipping of cattle will be conducted actively during the remainder of 1926.

Like the state last named, Louisiana also is awaiting the enactment of an adequate state law supported by an appropriation to eradicate ticks from a zone of from 6 to 8 parishes each year until the work is completed. The Louisiana Legislature will not meet until May. Meanwhile the areas already free or nearly free from ticks are protecting themselves against reinfestation from adjacent infested areas.

Arkansas is continuing the zone plan by which the entire territory lying north of the Arkansas River has been made practically tick free. The work also is far advanced in two counties south of the river. In addition, dipping is now being conducted in the first complete zone of four counties lying immediately south of the same river. Vat men, range riders, and supervisors already are busy dipping cattle, hunting stray animals, and keeping a complete record of the work. It is on such records and other evidence of cooperation that the United States Department of Agriculture bases its quarantine regulations—removing them when a locality is tick-free or establishing quarantine when ticks are present.

With the exception of one county in the southeastern corner of Oklahoma the state is practically free from ticks. That county claims to be unable to finance the work and is awaiting assistance from the legislature.

In Texas, public sentiment, as reflected by the new tick-eradication law passed in 1925, is favorable toward the work, which has been placed under the direction of the State Livestock Sanitary Commission. Unfortunately, the legislature adjourned without providing that organization with means to carry out the provisions of the enactment. As a result the Governor has endeavored to make available limited funds as a deficiency measure, but this provision is not considered adequate to care for the tick-eradication needs properly in counties and areas as large as those in Texas. This mat-

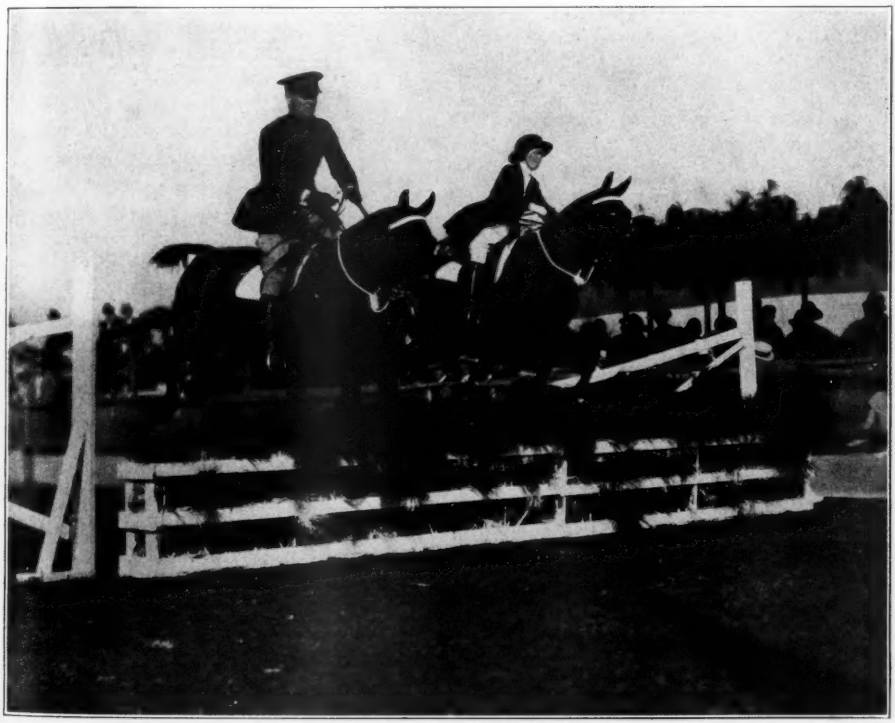
ter awaits adjustment by the next legislature.

"Since early spring is the season when active tick eradication begins," says Dr. R. A. Ramsay, of the Bureau of Animal Industry, United States Department of Agriculture, "it is well to emphasize that eradication in any area where the work is in progress can and should be completed in one season. The department urges that the work be organized and the efforts be so concentrated as to bring this result about in all sections where tick eradication is now in progress. We urge cattle owners to bear in mind that it is necessary that all cattle in a locality be dipped regularly without exception to make the work successful.

"During 1925 excellent progress was made in cattle dipping and as a result large areas were released from Federal quarantine. Besides, the work was completed in final clean-up activities in more than 70 counties previously released but where a few ticky herds still remained under local quarantine. With whole-hearted cooperation of all officials and cattle owners the present season should result in equally successful progress against cattle ticks."

An estimate has recently been made indicating that the industrial machinery of the country is now performing work that would require three billion people to perform if there were no machinery.

Measured by buying power of average weekly wages, the wage earner of today is about 25 per cent better off than in 1914 and about 7 per cent better off than at the peak of money wages in 1920.



Jumping in pairs. Captain Charles Dunphy of the Veterinary Corps, U. S. Army, and Mrs. Charles Dunphy, regarded as two of the best riders in the United States.

CANCER DEATH INCREASING

Study of cancer mortality for the 20-year period 1900 to 1920 made by the U. S. Public Health service shows:

"1. There has been a pronounced increase in the observed death rate from cancer in persons 40 years and over in that part of the United States known as the ten original registration States.

"2. Part of this increase (about 30 per cent) is due to greater precision and accuracy in the filling out of death returns.

"3. The remainder, however, is an actual increase in the mortality resulting in a death rate between 25 and 30 per cent higher than it was 21 years ago."

EXHIBIT SHOWS HOOKWORM CONTROL FOR DOGS, CATS AND MAN

"Carbon Tetrachlorid" is the title of an illustrated, three-section exhibit prepared by the United States Department of Agriculture. Carbon tetrachlorid, a well-known chemical, was proposed in 1921 by the Bureau of Animal Industry, of the Department, as a drug for the treatment of hookworm disease and is now in general use the world over for this disease in man and in dogs, cats, and foxes. More than 1,500,000 human hookworm cases have been treated with the chemical.

One panel shows a photograph of two brothers, one 21 years old weighing only 66 pounds, a hookworm victim, while his brother who was only 17 years old and not infected with hookworms weighed 126 pounds. Another panel illustrates hookworms and gives information concerning the animals they affect. A third points out that carbon tetrachlorid has saved the lives of thousands of dogs, especially of pups and hunting dogs in the South.

The exhibit is 30 inches high and when packed for shipment weighs approximately 75 pounds. A table 2 by 4 feet is suitable for displaying it. The exhibit will be loaned for a period not to exceed 30 days to responsible persons requesting it and agreeing to pay transportation charges. Applications will be filled in the order received and should be addressed to the Bureau of Animal Industry, United States Department of Agriculture, Washington, D. C.

It has been demonstrated experimentally that a severed optic nerve of a rat can reunite and at least partially recover its function.

It has been said that the greatest undeveloped resource is the odd looking spherical knob attached to the upper end of the spinal column of the genus homo.

The improvement of livestock by the use of pure-bred sires is producing noticeable results at least in some locations. Breeders in eleven of the forty-three counties in Kentucky are using pure-bred sires.

From one to three per cent of Chinese women of child bearing age are affected with osteomalacia and two to three per cent of pregnant women die of this cause.

An epidemic of scarlet fever which totalled 116 cases occurred in Flint, Mich., in 1924. A thorough investigation established the fact that the infection was spread by ice cream manufactured in a one man factory by a man that continued to work three days after he became affected with scarlet fever.

It has been found that some protozoa are killed by oxygen. From this principle there may be evolved a method of successfully treating anaplasmosis, piroplasmosis, amoebiasis, etc.

The synthetic production of wool from wood has been accomplished according to reports. It is not probable that synthetic wool will have any effect on the sheep or wool market in the very near future.

Eggs from hens that have been freely exposed to sunlight are rich in vitamin A and are of value as an anti-rachitic food. This vitamin has been found to be retained in eggs that were in storage for nine years.

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"DIAGNOSIS TO STOP DISEASE"

In the Annual Report of the Extension Service of the University of Wisconsin, Dr. F. B. Hadley, head of the Veterinary Department, describes the activities of the diagnostic laboratory as follows:

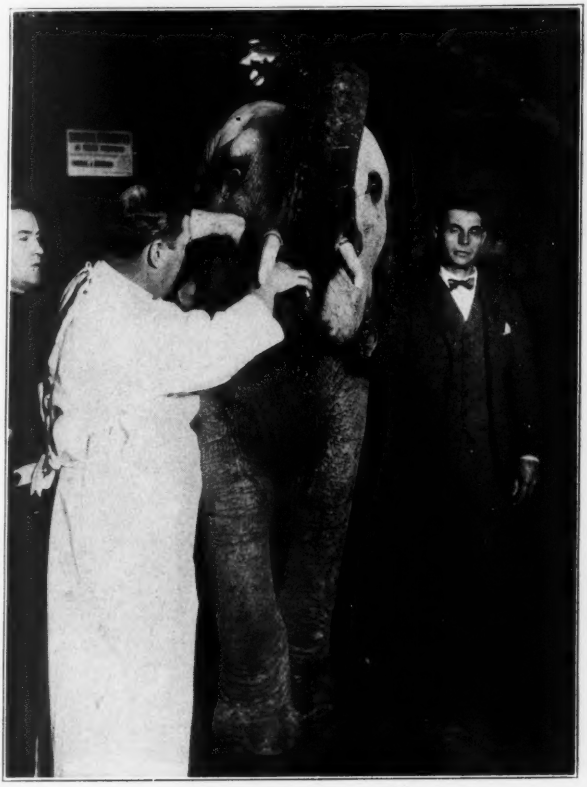
"This work is conducted primarily to help veterinarians in giving better service to their farmer clients. The information furnished is of most value when conveyed to the owner of livestock through a veterinarian, as of necessity it must be largely technical in nature. However, farmers are invited to send in specimens and are given as full information as is possible. During the year the Veterinary Science Laboratory received a total of 4,914 specimens for examination. Reports were made on these specimens directly to those who submitted them. Judgment as to the treatment, care, and management of the herds and flocks in question and the protection of neighboring herds from acquiring similar diseases was based upon this diagnostic work.

"That the confidence reposed by Wisconsin dairymen in the blood test for infectious abortion of cattle is well placed is attested by dairymen from the Hawaiian Islands, who bought from Wisconsin farmers 250 head of dairy cattle for export. The foreign buyers not only demand that all cattle before purchase must recently have passed the tuberculin test to insure freedom from tuberculosis, but also must pass the abortion test to detect abortion infection. While these requirements were new to some of the farmers who offered cattle for sale, practically all of them saw the buyer's point of view, and willingly complied.

"In addition to the 250 samples from cattle selected by the Hawaiians and the 3,398 from herds in which the abortion disease has broken out, a considerable number have been received of late from animals designed for shipment to certain southern states."

Kemp, the coarse hair-like fibers in wool and mohair, is much more prevalent than is ordinarily suspected. The loss in mohair may be as much as 30 per cent and constitutes one of the problems of the goat breeder. No doubt, by selection the percentage of kemp can be materially reduced.

During the past year the incidence of small-pox in the United States increased 75 per cent and the death rate 62.8 per cent.



Dr. Bretherton performing dental work on "Teddy," the Hippodrome elephant, New York City.

PHYSICIANS AND DENTISTS IN CONGRESS

There are six physicians in Congress and three dentists. Of the 96 members of the U. S. Senate, one, Senator Copeland, Democrat, of New York, is a physician; and one, Senator Shipstead, Farmer-Labor, of Minnesota, is a dentist. Of the 435 members of the House of Representatives, five, Hon. E. M. Irwin, Republican, from Illinois, Hon. L. Lazaro, Democrat, from Louisiana, Hon. J. J. Kindred, Democrat, from New York, Hon. W. T. Fitzgerald, Republican, from Ohio, and the Hon. J. W. Summers, Republican, from Washington, are physicians; and the Hon. Roy O. Woodruff, Republican, from Michigan, and Hon. Frank Crowther, Republican, from New York, are dentists.

Dr. Charles P. Childe, who died recently in Portsmouth, England, was a pioneer in the field of cancer control through education. In 1906 Dr. Childe published a book entitled "The Control of a Scourge." In it he advocated the education of the public in simple, hopeful language, which could be understood, in regard to the early recognition and proper treatment of cancer. This was the first book of its kind to appear and it is notable that a publisher could not be found to produce the book if the name "cancer" was to be included in the title. Last year Dr. Childe brought out a new edition of his book. The title was now "Cancer and the Public." So much progress had been made in the educational campaign for the understanding and control of cancer that the public was no longer likely to take alarm at the word "cancer."

Veterinarians who have to deal with animal surgery will be interested in noting that a somewhat similar practice is applied to trees. It is said that tree surgery has been known to the world only twenty-five years. It was founded by the late John Davey, who in 1901 published a book on the subject entitled "The Tree Doctor." His son, Martin L. Davey, is now president of the Davey Tree Expert Co., which has 700 tree surgeons in the field, with headquarters at Kent, Ohio. The practice of tree surgery can be compared with dentistry. The tree surgeon excavates all decayed matter, disinfects and waterproofs the cavity, then fills it with concrete. The concrete is laid in sections to accommodate the strain of swaying in the wind. New bark grows at the edge of the filling and, in time, completely covers it.

The calcium content of the blood is materially reduced in whooping cough. Is whooping cough a calcium deficiency disease?

The sledge dog is again coming into prominence in transporting prospectors to the gold rush at Red Lake, Ontario. Prices for such dogs vary from $100 to $200.

The United States Biological Survey have established experimental beaver farms to test the value and practicability of raising these animals for their fur.

The intermediate host of the liver fluke of the goat is a snail. This parasite is not very destructive to goats in the United States because goats are usually maintained in the semi-arid districts.

According to Insfran of Asuncion, Paraguay, the use of carbon tetrachlorid is not contra-indicated in pregnant women. It is presumed this same principle applies in pregnancy in domestic animals.

Nyberg found that children who consumed quantities of blueberries were relieved of certain intestinal worms, oxyuris especially.

The fact has become pretty well established that so-called bad air in improperly ventilated places is not detrimental, due to increased carbon dioxid content or other gases, but temperature and humidity are the factors that produce the end results that are undesirable.

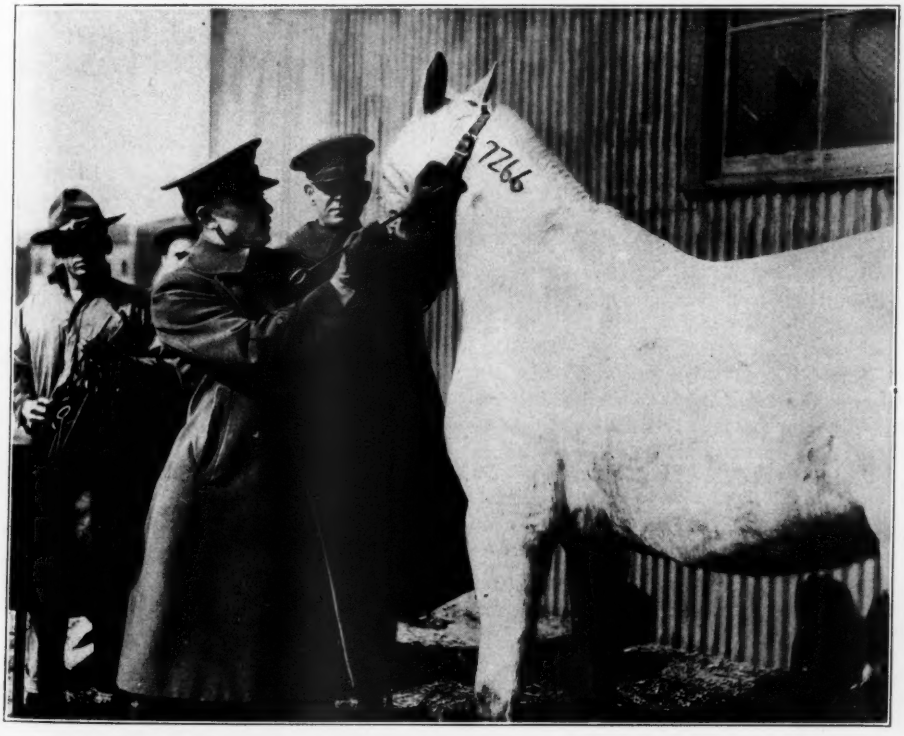
A high moisture content characterizes the flesh of emaciated cattle. The moisture content of the flesh of normal cattle is from 18 per cent to 25 per cent whereas the moisture content of the flesh of emaciated cattle is in excess of 25 per cent.

According to information obtained from a rare fifteenth century volume, John Nufer, a swine gelder (veterinarian) successfully performed cesarean section on his wife in 1500. The child was born alive, the wound healed without infection, and several years later the woman gave birth to twins in the normal way.

It has been found that men working in hot mines or perspiring freely over considerable periods, are much benefited by addition of small amounts of salt to drinking water or at least they should consume one-half as much more salt as usual, to replace that lost in sweating, and prevent nervous symptoms, cramps, etc., from appearing.

The preservation of blood in its original state physically, histologically and chemically for a considerable period of time has been made possible by a vacuum tube devised by Dr. John of Cleveland. The tube holds one and one-half c.c. and the preservation of the blood is affected by the use of a small quantity of powdered fluorid thymol. This discovery makes possible the analysis of blood samples collected at variable distances from the laboratory.

The function of the spleen has been a



Lieut. Henry Dupree of the Veterinary Corps, U. S. Army, Governor's Island, applying the branding iron to a horse for identification. The branding system is quite humane, a soothing salve being first applied to the horse's skin which has been clipped of hair.

moot question for many years. The production of certain blood cells and purifying action upon the blood are known splenic functions. Recently it has been suggested that the spleen is an important source of antibodies and possibly also of products that antagonize the development of tumor cells.

The production of an immunity against tuberculosis in animals and man has been attempted by many investigators with varying degrees of success. It has been rather conclusively demonstrated that an immunity against tuberculosis prevails only in those individuals in which there are tuberculous lesions, that is, "only the tuberculous are immune to tuberculosis." The principal difficulty encountered in artificially immunizing against tuberculosis has been in obtaining tubercle bacilli of the proper degree of virulence to produce a local lesion without a tendency to generalization. Susceptibility to tuberculosis varies in different animals and it has been found that tubercle bacilli used successfully in immunization of one animal may produce generalized tuberculosis in another animal. The solution of the difficulties in tuberculosis immunization may have been solved by Calmette and Guerin for according to a recent report they have apparently successfully immunized children against tuberculosis by the use of tubercle bacilli that have been attenuated by thirteen years growth on bile. Although the Calmette-Guerin experiment has thus far been successful it would be premature to recommend the general use of their method in the control of tuberculosis either in humans or cattle.

Losses of cattle fed on sweet clover hay have been reported from various sections of the country. These losses are due to a mold or the by-products resulting from growth and development of the mold in the pith of the sweet clover stem. This malady is manifested by anemia and noncoagulability of the blood.

Two types of this disease have been described. An acute rapidly fatal type in which there is hemorrhage into any part of the body. Such hemorrhages produce noticeable swellings of various dimensions when the hemorrhage occurs in the subcutaneous structures. The swellings develop rather rapidly and are sensitive in the beginning. Such swellings occurring on the legs interfere with locomotion. There is no rise of temperature and affected animals may eat until they die.

The subacute or chronic type of this malady is characterized by anemia and non-coagulability of the blood. Minor surgical operations in these cases may terminate fatally because of persisted hemorrhage. Thus, Drs. A. G. Wadleigh and W. M. Decker, veterinarians, recently observed the loss of 60 to 80 cattle from hemorrhage following the simple operation of dehorning. Upon investigation, it was found that the cattle that died were being fed sweet clover hay and it was demonstrated that the blood from sweet clover fed cattle did not coagulate.

Pink eye, strangles, pneumonia, and hemorrhagic septicemia separately or in various combinations are the usual diseases of horses and mules incident to shipping. Pink eye or the old type so-called influenza has not been very prevalent during the last few years but diseases resulting from infection with streptococci and B. bipolaris have been relatively common, and although the percentage of fatality is not large, these maladies are of considerable economic importance because of the loss of condition of the affected animals.

B. suipestifer infection in swine is quite prevalent on farms in the Missouri Valley. This infection undoubtedly caused greater losses during the last four months of 1925 and first two months of 1926 than all other maladies in swine. This infection is usually localized in the digestive tract, however, it may become generalized resulting in septicemia. This condition is manifested by a high temperature, inappetence, arched back, frequent urination and blue belly.

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Fractures of the Mandible of the Horse

H. E. BEMIS, Department of Surgery, Iowa State College

FRACTURES OF THE MANDIBLE are difficult to treat in the ordinary way, that is, by the use of splints, on account of the difficulty of keeping the fracture reduced and the difficulty of preventing pressure necrosis. Therefore, the use of screws or of screws and plates whenever the fracture is of such nature that their use is at all possible is advisable. Two case reports from our clinic will serve to illustrate two kinds of fracture which may be so treated.

The first case was a fracture of the body of the mandible along the mandibular symphysis in a two-year old colt. There was a slight lateral displacement of the rami. It was the result of a fall. The instruments used were a steel screw about two inches long, of small diameter and very gradual taper, such as is used in hard wood, a small drill, a screw driver, scalpel and bone cutting forceps.

The animal was confined on the operating table, the mucous membrane anesthetized and a small incision made at a point on the lateral surface of the mandible just beyond the roots of the incisor teeth. Within this incision the drill was passed through the bone to a point beneath the mucous membrane on the opposite side. After removing the drill, the screw was placed in the drill hole and the head of the screw drawn down tight against the bone. If the screw should be too long, cut it off flush with the bone after it has been seated. Usually one screw is sufficient for this operation. The screw remains in position until healing takes place. At the end of that time it may be taken out or left in if not causing any trouble. In the case reported, the screw was not removed and the animal made rapid and complete recovery.

The second case was a fracture of the left ramus of the mandible in a 12-year-old mare, accompanied by a severe traumatic myositis of the right masseter muscle which resulted in considerable swelling, intense pain and later abscess formation.

The fracture was in the inter-dental space and was oblique from above, downward and backward. There was displacement of the incisors downward and toward the right allowing prolapse of the tongue. The fracture was compound within the mouth just anterior to the first cheek tooth.

A Lane's plate two inches long and provided with four screw holes was bent to fit the contour of this portion of a mandible taken from the specimen case. The plates, screws, screw driver, drill, and the usual instruments for incision, holding and suturing were sterilized while the animal was chloroformed and the field prepared.

An incision about five inches long was made through the skin and periosteum on the lateral surface of the mandible crossing the line of fracture. The periosteum was stripped back, the fracture reduced, the plate put in position and screwed tight to the bone. Each screw hole was started with the drill. The periosteum was sutured over the plate with catgut and the skin sutured with silk, leaving drainage on account of the compound condition of the fracture.

The animal was not fed nor watered for four days and was then allowed to drink water and sloppy foods for a period of ten days. The fracture maintained good apposition and was held solid at all times. In two weeks a sequestrum appeared and was taken out and the plate removed.

An abscess developed within the right

masseter which caused the whole mandible to deviate toward the left side and greatly limited movement of the jaw and prevented complete closure so that eating was difficult and the tongue protruded. After the abscess was opened this condition gradually subsided and the case was well on its way to recovery when discharged from the hospital, March 17, 1926. A report received from the owner on March 27 was to the effect that the animal was improving satisfactorily.

The Present and Future of the Veterinary Profession*

A. T. KINSLEY, Kansas City, Mo.

THERE HAS BEEN much discussion, in the last few years, some relevant and some irrelevant regarding the present status and future propects of the veterinary profession. Historians have said that conditions existing during a certain period can be quite accurately ascertained at a later date by a careful study of the literature produced during that time. If the historians' statement is true the succeeding generations will conclude that the veterinary profession was in a deplorable condition in 1923, 1924 and 1925. It is true that there was a marked depression in the demands for veterinary service beginning in 1920, but a like depression occurred in practically all lines of human endeavor. In order that the subject may be intelligently discussed the terms "veterinarian" and "veterinary profession" will be defined.

A veterinarian is one skilled in veterinary science. Veterinary science deals with the nature, prevention and treatment of animal diseases, the sanitary housing and care of livestock, and similar matters affecting the health of domestic animals, and the healthfulness and wholesomeness of their products.

A profession has been defined as an occupation, if not purely commercial, mechanical, agricultural or the like, to which one professes to have acquired some special knowledge used by way either of instructing, guiding or advising others or serving them in some capacity because of one's learning. Religion, law and medicine are the learned professions. The veterinary profession is an integral part of the medical profession and is therefore a learned profession. There is a distinction between commercialism and professionalism, although it is true that a professional man whether he be a minister, lawyer or doctor, must of necessity apply business principles in his professional career; otherwise, he soon becomes eliminated. A professional man is within the bounds of professional ethics when he sells his professional services. The primary incentive for preparing one's self for a professional career should be love of service, not for the purposes of accumulating riches.

Before beginning the discussion it also appears advisable to call your attention to the fact that the veterinary profession in America is composed of practitioners, federal, state and municipal regulatory officials and sanitarians, army officers, teachers, investigators and those engaged in commercial enterprises. All of these groups have been factors in establishing the present status of our profession and will be factors in determining its future. There is no definite method of foretelling the future; however, a careful survey and analysis of the conditions and events leading up to our present status should aid in judging the future.

The veterinarian, and particularly the practitioner, was prosperous during the period of the war and until about 1920 when the depression of agricultural commodities occurred. Since that time there has been a

*Presented at Kansas Veterinary Medical Association Meeting, Topeka, Kansas, Jan., 1926.

gradual readjustment although the price of live stock and the income of the practitioner are less than they were during the war. During the depression the live stock producer resorted to various means of economizing, including the vaccination of his own hogs. In some cases disease progressed unheeded because the afflicted stock was not worth the necessary veterinary fee to treat them. In addition to the depression in agriculture the following factors have contributed their part establishing our present status:

1. Commercial concerns, particularly producers of biologics and supply houses.
2. State agricultural colleges and experiment stations.
3. Veterinary practitioners.

Producers of anti-hog cholera serum and virus, agressins, vaccines and bacterins have, perhaps unconsciously, seriously injured the practitioner and the live stock interests by a sales policy permitting an unjustifiable fluctuation of prices of these various products. Thus the price of reliable anti-hog-cholera serum may be quoted at $1.00 per hundred cc. in January, 75c in April, 49c in August and 67½c in October. It is generally conceded that the cost of production in any well regulated serum establishment will not vary more than 15c per hundred and there is therefore no occasion for such marked fluctuations in prices. Responsible practitioners have difficulty in establishing a fair price for the immunization of swine and owners become dissatisfied and it is apparent that the practitioner and the live stock owners will be better served and more contented if the price of anti-hog-cholera serum and other biologics was stabilized and these products sold at a fairly constant price that would return a fair margin of profit to the producer, practitioner and live stock owners.

The state agricultural college and experiment station is of untold value in the development of the agricultural resources. However, if the activities of such an institution are not properly directed injustices will be done to legitimate private enterprise. The college in your state maintains a serum plant in which anti-hog-cholera serum and virus are produced. If we have the information correct, these products may be purchased by any live stock producer in your state. Lay vaccination is an expensive privilege and the production of serum and virus by a commonwealth for such purpose or as a commercial commodity should be discontinued. The production of anti-hog-cholera serum and virus by your state has apparently led up to another problem—viz., permission of employees to go into the field and administer these products. In at least one instance this practice occurred in a community where reliable practicing veterinarians were available. This is a paradoxical situation—a state institution maintaining a veterinary college in which state funds are expended in educating men for veterinary service and simultaneously maintaining a serum plant and sending an employee into the field to do veterinary service It is hoped that such practices have been discontinued for they have been contributing factors in causing dissension.

In keeping abreast of the times the state college installed one of the best broad-casting stations in the country. Much valuable information is being given in the "school of the air program." I have been told that some veterinary lectures detailing symptoms and treatment of some diseases of farm animals have been given and in one instance a farmer listening in made a mistake in diagnosis and the treatment prescribed killed some of his animals. It is unfortunate if treatment of disease of any farm animals has been broadcasted by representatives of the veterinary division of the college, or any one else, because laymen are not familiar with drugs or biologics and their use, even though it was possible for them to make a correct diagnosis. Those men that have not been successful in applying the broadcasted treatment, not only condemn the college, but also the veterinary profession.

The veterinary practitioner has been an important factor in establishing the present status of the veterinary profession and he will be the most important factor in deter-

mining our future, because practitioners outnumber all other veterinarians and they are in actual contact with those interested in live stock. Unfortunately the acts of a few unscrupulous veterinarians have reflected upon and seriously handicapped the entire profession.

There has been a marked change in veterinary practice in the last twenty years. Those of you that have been in active practice for fifteen years or longer will recall that equine practice constituted 90 to 95% of the veterinarian's business at that time. The increasing prices of meat food and dairy animals in recent years caused a demand for veterinary service in treating and preventing diseases in cattle, hogs and sheep, and within the last five years the poultry interests have been seeking an efficient veterinary service. Present day practice, particularly that of meat food animals and poultry, involves many animals, herd units, whereas the equine practice was confined largely to individuals. This change from treatment of an individual to herd units increased the responsibility of the veterinarian and an increased income was therefore justifiable. Unfortunately a few veterinarians charged an unreasonable fee for vaccination of hogs against cholera. Those few unscrupulous veterinarians were responsible for the controversies that ultimately resulted in modifying the sanitary laws in some states so that laymen were legally permitted to use the virus and serum on their own hogs. Some states provided for vaccination schools to prepare men to do their own vaccination. It is probable that county agent vaccination received its principal stimulus in this way. Other acts and deeds of some practitioners have reflected on the integrity of our profession.

All of the misunderstandings can be adjusted by cooperation of each of the veterinary groups and the livestock producers. The veterinary profession will survive and it is my opinion that the large percentage of vaccination against hog cholera, hemorrhagic septicemia and other infections will be done by veterinarians because they alone are qualified to identify the different infective diseases of farm animals. The increasing demand for dairy products will require an increased veterinary service in that line and those veterinarians that are equipped to successfully treat diseases of poultry will be surprised at the added income from that source.

Another very serious reflection on the practitioner and the entire profession has been brought about by the use of veterinary pharmaceutical specialties. The prescribing of the major portion of pharmaceutical specialties must be taken as evidence of a lack of therapeutic knowledge by the prescriber or an attitude of carelessness because there is a difference in the response of animals to drugs and there is a variation of the same disease even in the same species of animals. Pharmaceutical specialties have been prepared for practically all known ailments of farm animals. No doubt some of these preparations are of value and can be used to advantage, but the universal use of these products, as is done in some instances, should be condemned.

Therefore, let the veterinarians, teachers, serum plant employees, radio broadcasters, sanitarians and practitioners lay their cards on the table, discuss these problems, adjust any misunderstandings, and pull four square and make 1926 a banner year for the veterinary profession.

The destruction of about 3,000,000 prairie dogs and other rodents in northern Arizona in the course of a recent poisoning campaign has, it is estimated, increased the forage production of the area by more than 76,000 tons. The Biological Survey of the United States Department of Agriculture, which, in co-operation with the State Agricultural Extension Service, inaugurated and directed the campaign against the prairie dogs, points out that if this forage were valued at only 50 cents a ton its worth would be about $38,000. Clearing the area cost less than 4 cents an acre. As a result of the campaign one wool grower was able to place 6,000 more sheep on the range. Another completely exterminated the prairie dogs on 50,000 acres at about 1 cent an acre. Many alfalfa growers on the Prescott Farms project have increased their alfalfa yield more than a third in the same way.

Sweet Clover Poisoning of Cattle

F. B. HADLEY, University of Wisconsin

THE ABOVE SUBJECT was discussed at the recent short course for Wisconsin veterinarians by Dr. L. M. Roderick of the Department of Veterinary Science at the North Dakota Agricultural Experiment Station in a most interesting and instructive manner. In his opinion this new cattle disease appears to be occurring with greater frequency and over a wider territory with the more general use of sweet clover as a feed.

In confirmation of the opinion expressed above may be mentioned a letter from a rancher in Colorado recently received by the writer. This letter reported the loss of 70 yearling calves out of a herd of 80 from hemorrhage following dehorning. While the majority died as a result of blood flowing from the blood vessels severed when the animals were dehorned, some deaths were due to internal hemorrhages. From the fact that the bulk of the roughage fed was sweet clover hay, a diagnosis of this disease was justified. It is to prevent the occurrence of similar losses that this article is written to give veterinarians the latest information available on the subject.

Dr. Roderick reported the results of the research work that he and his chief, Dr. A. F. Schalk, have done on this subject during the past three years. His discussion was closely followed by the 150 veterinarians in attendance and stimulated a lively discussion. The chief points of importance relative to sweet clover disease that were brought out are as follows:

1. It is a demonstrated fact that certain specimens of molded, spoiled or damaged sweet clover hay and silage cause a definite hemorrhagic disease in cattle.
2. There is no evidence of such disease from feeding on good, clean, well preserved sweet clover hay and silage.
3. As yet, the disease has not been demonstrated in other species of livestock.
4. Not all specimens of spoiled or damaged sweet clover hay and silage cause the disease.
5. The kind and degree of mold or spoilage, as determined by ordinary inspection, do not determine whether a specimen is or is not dangerous for cattle. Moreover, the toxicity of the hay does not appear to be in proportion to the visible damage, although much of the incriminated hay is obviously damaged.
6. The symptoms which the owner may possibly recognize are swellings under the skin and a stiff, lame gait. However, either or both of these may be entirely absent.
7. The skin swellings may be mistaken for those of blackleg. But, unlike blackleg they are more firm and do not give off a cracking sound when passing the hand over them.
8. The most serious and constant feature of the disease is the decrease in or complete loss of the clotting power of the blood.
9. Animals actually bleed to death, internally and following dehorning, castrating, and other surgical operations.
10. If the animals have not bled beyond the physiological limits, most cases can be saved by injecting them with fresh, defibrinated blood from healthly cattle.
11. Perhaps the best known method of prevention is to alternate the damaged sweet clover every 15 days with some other forage. Of course less danger is encountered when feeding only small quantities of the spoiled sweet clover.
12. All dehorning, castration and other surgical operations should be withheld for at least 15 days after the animals have been taken off the spoiled sweet clover.

13. From a limited amount of experimentation, indications are, that this disease does not develop from green sweet clover pasture. Accordingly it is best to use alfalfa for hay and sweet clover for pasture.

Anyone interested in securing more detailed information about this subject should write to Dr. A. F. Schalk at Fargo, North Dakota, for a copy of his recently issued circular 27 entitled "Cattle Disease Resulting From Eating Damaged or Spoiled Sweet Clover Hay or Silage," from which the above statements were taken.

In this connection should be mentioned a preliminary report of work by Dr. C. P. Fitch of the Department of Veterinary Medicine at the Minnesota Agricultural Experiment Station with extracts of toxic sweet clover hay and with pure cultures of molds found growing upon it. He was unable to demonstrate a toxic principle in either. This would tend to disprove the popular idea that the presence of molds may be used as a guide to determine whether certain hay would be safe to feed. Furthermore, this evidence failed to incriminate molds as the direct cause of a disease concerning the etiology of which little is definitely known.

Tuberculosis Eradication*

R. A. MOYE, Manchester, Iowa, Delaware County Tuberculosis Inspector in Charge.

THE ERADICATION OF TUBERCULOSIS has been discussed at such great length that one would think there would be nothing more to say on the subject. However, as time goes on, we are sure we are on the right track but also we are learning that there are phases of the work which we have, in the past, given some thought, but at the present time they are demanding more study and are becoming of great importance in reaching the goal we are seeking. At the present time we are face to face with a situation where the public has not only been educated to the necessity of eradicating tuberculosis but they are demanding it and putting the responsibility up to the veterinarians. It has been proved to the people that we have an efficient practical test and veterinarians capable of applying it. But have we done all that we should in putting up to the cattle owner the responsibilities which belong to him, in removing the infection from the farm and keeping up the barriers against reinfestation after the infected animals have been removed from the herd?

It has been known for a long time that tuberculosis existed among our livestock, but it was not until we knew the great extent of the infection and the damage it was doing that we, as a nation, realized the importance and necessity of at least checking the ravage and the great financial loss resulting from this disease. A cure was first hoped for, but as a result of this hope a means of diagnosis was discovered. The problem of getting all the veterinarians to accept the tuberculin test as efficient, was not altogether an easy one. During my activities as a veterinarian, I knew of discussions in which veterinarians were very skeptical about the tuberculin test. After the veterinarians, as a profession, had adopted the test, then came the problem of getting the public to see the necessity of eradicating the disease. This was done with a great deal of time, expense and effort. In my opinion, the accredited herd plan has done more along this line than any one other factor. Different civic and farm organizations have played a great part in this connection and it goes without saying, that the veterinarian is deserving of no small credit and he is to remain a factor until the end is reached. When we stop to think what a comparatively short time the

*Presented at 1926 Meeting of the Iowa Veterinary Medical Assn.

intensive campaign has been in operation, it is nothing short of a marvel to see how great the demand from the public really is.

Let us stop for a minute and see how in recent years we were so very much concerned about the efficiency of any one or all the tuberculin tests. We all had our individual experiences. We also had our doubts and wonders. At times we would think this or that was the real test and then again conditions would arise in our own individual work which would make us wonder how such a result could happen. Now we can look back and see why, in many cases, we were so much at sea. We were so concerned with the tuberculin test that we did not bring out all the necessary information we needed to make a correct decision. The owner did not tell us all about the association, conditions, etc., in regard to the herd or the individual animal. As a result many of our doubts about the efficiency of the test were unjustly charged against it. This we sometimes have learned a year or more after the test was applied. We were so worried about the technic of our injections that we went through all kinds of acrobatic stunts to make sure that it was done just so. This resulted in a great deal of benefit to us all. But after our experience under intensive work we learned there are other things, besides the tuberculin test when it comes to eradicating tuberculosis.

At the present time the different counties and localities in Iowa are presenting such a variation in circumstances and conditions that what may be a serious problem in one place can be very easily handled in another. Some counties are still working under the accredited herd plan; some under the fifty-one percent signers and some under the compulsory regulations. Some sections confine their live-stock operations to feeding, others to dairying and others to both. There is also a great difference in the amount of infection in different parts of the state. All these things make it hard for us to discuss tuberculosis eradication and at the same time all have the same degree of interest in all the problems presented.

The mode of infection has caused no little worry in the past. Now that we are reasonably sure of this it is going to be no small task to get the cattle owner to appreciate the importance of it and to know that he must become thoroughly educated with this side of the question if we ever are to reach the end we are after. It often happens that the reinfestation of a clean herd can, without a doubt, be traced to the lack of knowledge on the part of the owner as to the different ways infection can enter his herd, such as feeding buttermilk from whole milk creameries; buying exposed cattle, although they have been tested recently; association in pastures with cattle which have not been tested; use of infected bulls; allowing neighbors to breed infected cows to a bull from a clean herd; common and promiscuous use of watering troughs; lack of thorough cleaning and disinfecting of barns, sheds, watering troughs, salt licks, low spots in lots and pastures; undesirable drainage from feeding lots and adjoining farms, and not testing cattle before adding them to the clean herd. No doubt a discussion could bring out as many more. It is my opinion that we have not pushed this side of the work as strongly as we should, and without this the tuberculin test is bound to fail. This information can be gotten to the owners by repeated telling and through the journals and daily newspapers. Each veterinarian, whether county or private practitioner, has this duty to perform.

In my mind the hardest part to put across has been, is and will be the proper cleaning and disinfecting after the reactors have been removed from the herd. Although I am satisfied that most of the owners are conscientious in trying to do as they are told, it is not the nature of the male sex to know how to clean. This can be verified by going into the home of a poor unfortunate man who has been left home to "batch" for a week or so while the good wife is away on a vacation. I find a much better job is done when you are able to interest the women in accepting the responsibility of supervising the cleaning. On

your return trip, she will not hesitate to tell you if the man did not do as she instructed him, and if more reactors are taken he has put himself "in a bad way."

In cleaning the farm and herd of tuberculosis, I know I am not far wrong when I say that it is the idea of the majority of the cattle owners and the public in general that this is the job of the veterinarian. This is only partly true. The owner is just as much responsible in reaching this end as the veterinarian and I think a great deal more so. I do not mention this with the idea that I am telling you anything new; I do it because of the difficulty in getting the owner to realize the responsibility he has in this work—and because I am convinced that it is costing the people a great deal of money which could be saved by the owner doing the things he should do. When it is necessary to go back and test a herd six, seven, eight and more times, there surely is something wrong. I am satisfied that in many cases it is due to a lack of elbow grease and too much indifference on the part of the owner in carrying out his part. In our regulations this has all been thought out and provided for, but I think we should find some means of putting it across better than we do. We tell the owner to clean and disinfect and leave him a copy of instructions. I do not think this is enough. Personally, I am sure I have made headway by making an inspection of farms after receiving the card that the premises have been cleaned up. Disinfection has been emphasized so much through the farm papers that the average farmer accepts it as a cure-all. Without the cleaning I think you might just as well put the dip in the well and you will do the barn just as much good so far as getting rid of the infection.

It has been my experience that when it is necessary to repeatedly take reactors from a herd, the owner expresses a disgust and dissatisfaction with the test and is sure it all is still an experiment. But when you can get a correct history of the herd and point out the things the owner failed to do and express your disgust and dissatisfaction with the way the owner is handling his part, and in some cases go so far as to advise him to drop the testing as there is no use in going on this way, with a very few exceptions he will have a change of heart and attitude and will be willing to pay some attention to the things which are expected of him.

In passing, let me mention the case, which so often happens, where a farmer will come to you in a very confidential way and tell you that he heard it was possible that an animal could be so rotten with the T. B. that she would not react. This is the only ground the opposition to the test can stand on and it is very anxious that every one know about it. It takes the farmer off his feet when you tell him that that is a fact and you are surprised that he did not know it a long time before. He always marvels when you tell him how easy it is to locate most of these animals by physical examination in conjunction with correct history, and *honest* cooperation on the part of the owner.

In closing, let me say we can not spend too much time and effort in letting the public know the part the cattle owner must play in the process of eradication of tuberculosis. If we wait until we think we are on the home stretch and find the owner and the tax payer dissatisfied because of the long time it will require to clean up without the cooperation of the owner, what we will have to say then will be taken as an alibi and the veterinarian will be criticized for not emphasizing the owners' cooperation at a time when it could have done the most good.

Over one million pounds of mohair was shipped out of Kerrville, Texas, during the fall of 1925. This represented the fall clip. The sale price was 55 cents for the kid and 70 cents per pound for the grown hair. From these figures it is evident that Angora goats are making a good profit and no doubt many others will enter this field soon.

Experiences of a Laboratory Worker in the Deficiency Diseases of Live Stock*

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IN ATTEMPTING to speak on the deficiency diseases of live stock, I beg to call your attention to the fact that all diseases of nutrition are diseases having their origin either in an excess or a deficiency of certain constituents, and thus under the caption of deficiency diseases I might very well treat of the insufficient intake of energy, protein or even individual amino acids, or of the effect of withholding fat or carbohydrates. I might also speak of the effect of lack of sodium chlorid, lime, iodin or even iron. These inorganic elements especially have occupied a very prominent place in nutrition investigations because of their scarcity in plants grown in certain regions, their variation in plants with climatic conditions and the tremendous need of the animal for them under special conditions such as milk production. A cow producing 20,000 pounds of milk a year will during that time put out 142 pounds of minerals though her body contains only 51 pounds. In the past the emphasis has always been put upon protein and energy, and the mineral elements, outside of ordinary salt, have been left to be taken care of incidentally.

I came in contact with this general problem in 1907 when there were started at the University of Wisconsin certain experiments to test out the inadequacy of the then prevailing conceptions of what the ration for an animal must include to be satisfactory. Dr. S. M. Babcock always expressed the belief that he could compound a ration satisfying all the requirements imposed by our modern feeding standards and yet obtain complete failure of nutrition, and so there were started under the direction of Prof. E. B. Hart experiments attempting to nourish young heifers on rations balanced respectively from constituents of the corn plant, the wheat plant and the oat plant.

The result of these experiments was that while all the heifers grew fairly uniformly, disaster resulted when the wheat and oats fed animals were subjected to the strain of reproduction. Some improvement was obtained by the addition of minerals, especially lime salts—fundamentally failure was due to a lack of vitamins.

Quite similar results were obtained with pigs. Pigs confined in pens with cement floors were not successfully reared on a ration of grains and their concentrates. Again some improvement was secured by the addition of lime, but later it was realized that certain vitamins were lacking and without their addition no satisfactory nutrition was possible. This then brings me to the essence of my talk —the relation of vitamins to the satisfactory nutrition of live stock. To introduce this, I shall have to make use of illustrations obtained on small laboratory animals because clear-cut uncomplicated illustrations with large animals are not available.

At the present time we recognize the existence of five distinct vitamins, viz., A, B, C, D, and E. All are indispensable for the maintenance of growth in the animal at one time or another and in one form or another. None has been isolated in pure form but they can be distinguished because in natural foods they do

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not always occur together, they vary in solubility—A, D and E being soluble in fats, B and C in water—and they all produce different effects in the animal when absent.

Vitamin A prevents certain ophthalmias and infections of the respiratory tract. In its absence certain secreting epithelial tissues are changed into keratinized non-secreting tissues, resulting disastrously for the eyes, the bronchi, the lungs and often the kidneys and pancreas as well.

Vitamin B prevents certain neuro-muscular phenomena characterized by extreme spasticity, convulsions and partial paralysis of the gastrointestinal tract leading to cessation of food consumption and ultimate starvation.

Vitamin C prevents scurvy. Without it multiple hemorrhages occur subcutaneously, intramuscularly and subperiosteally complicated by fragility of bone and swelling of the joints. Man and monkey as well as the guinea pig need this vitamin. Some animals such as the rat and chicken apparently can synthesize it from certain precursors in the diet.

Vitamin D prevents rickets by making it possible for the animal to assimilate lime more efficiently and to retain it when assimilated.

Vitamin E functions in reproduction, making possible the normal growth of the embryo in utero. When it is absent ovulation, impregnation and implantation occur normally, but sooner or later resorption of the partially developed embryo occurs and young are never born.

In our studies with live stock, vitamin B, C and E deficiencies were not encountered. There is no evidence that live stock require vitamin C in the ration and vitamins B and E are found abundantly in grains. But we did observe deficiencies of vitamins A and D.

Vitamin A deficiency resulted because all ordinary grains outside of yellow corn, certain varieties of peas and millets and soy beans do not contain it; neither is it present to any extent in straws, though it is contained in hays. It can therefore be appreciated why many of our pigs died of respiratory infections and why one of our wheat fed heifers actually went blind.

Vitamin D deficiency resulted because —and this may sound peculiar to you— of insufficient exposure of the animals or their rations to light and specifically ultra-violet light. There occur in plant and animal materials, certain substances which the action of ultra-violet light has imparted to them, properties which enable them to stimulate normal calcium metabolism. Allow me to illustrate.

When we fed rats a ration composed largely of cereal grains and 3 per cent $CaCO_3$, after an interval of five weeks their dried bones contained from 22 to 31 per cent ash. But when we first exposed this ration to ultra-violet light as produced by a quartz mercury vapor lamp for 30 minutes, we obtained an ash content of bone ranging from 43 to 55 per cent.

To us when we first discovered this reaction this appeared almost unbelievable. Allow me, for instance, to call your attention to the progressive nature of this calcium deposition. When rats were first made rachitic by the feeding of a grain ration well known to produce rickets and then changed to the same ration which had been irradiated for 30 minutes, after six days calcium deposits just began to make their appearance. In ten days more calcium had been deposited, and in nineteen days the bone was almost completely healed.

Sunlight has the same effect though to a less degree because it contains but little ultra-violet. To demonstrate its effect we cured clover hay under various conditions, viz.: (a) in the dark, (b) in the sun, and (c) in the sun, dew and rain, and then fed it to rats as incorporated in a rickets producing ration at a 5 per cent level. When cured in the dark it did not prevent rickets, but subsequent irradiation with ultra-violet light made it active. Cured in the sun, or in the sun, dew and rain, it was active without further treatment.

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But as I have already stated, sunlight is not as active as it might be. Our experience has been that exceedingly prolonged exposure to sunlight, totaling twenty-eight days, will not produce the same effect as a thirty-minute exposure to the radiations of a quartz mercury vapor lamp. This indicates that qualitative as well as quantitative differences are responsible for its decreased activity. Probably certain rays in sunlight counteract the action of the limited ultra-violet contained therein so that even prolonged exposure will not produce the same effect.

As I have already stated, this effect upon the calcium metabolism of an animal can be brought about by direct irradiation of the animal. This is not a new discovery with us. It represents merely an agricultural application of what had been demonstrated with infants in human medicine in 1919. Then it was shown definitely that ultra-violet light alone will cure rickets.

We showed that the same effect upon deranged calcium metabolism is produced in the adult. For this we used a goat as the experimental animal. On a ration containing plenty of lime but deficient in vitamin D, a goat will lose large quantities of lime above the amount in its ration. But with exposure to the radiations of a quartz mercury vapor lamp these losses are reduced or entirely eliminated.

This effect is brought about by the activation of the inactive vitamin D found extensively in the animal's body. If the animal happens to be producing milk, much of the vitamin D is secreted into her milk. In some cases we have actually found the rickets preventing properties of milk increased four to five times even when the goat was irradiated only thirty minutes a day.

Apparently in chickens we find the greatest need for ultra-violet radiation, which is probably related to the tremendous activity of their calcium metabolism during egg production and their very rapid rate of growth in early life. Not only will a brief period of exposure of ten to thirty minutes a day to a quartz mercury vapor light prevent and cure so-called leg weakness or rickets in chicks, but egg production may be increased three to four times, as we have found in certain experiments. Here again as in the case of the dairy cow the antirachitic property of the product is enormously increased. Not only does the young chick hatched from such an egg have a better chance for existence in early spring, but man is directly benefited because eggs produced under such conditions represent a far better article of food.

Under the present practice of housing our stock in barns there is absolutely no question but that they do not receive enough sunlight and therefore not enough ultra-violet. I want to leave with you the question, if it is not possible that our dairy herds have been bred for quantity production to such an extent that deficient lime assimilation may in part be unavoidable. It is not too far removed to suggest the possibility that it may in part be responsible for the sterility and non-contagious abortion which is becoming more and more prevalent in high producing herds. If so, it is possible that ultra-violet light may be a more beneficial agent than is even now appreciated —and in addition, it is not to be forgotten that it represents a very potent curative agent in tuberculosis.

Though it is to be admitted that most of the diseases to which live stock are ordinarily subject cannot be related to vitamin deficiencies, yet there is no question that at least one, and that one of the most prevalent ones, is of such origin.

Rickets is a relatively common disease of children. Ninety per cent of a group of children in a New York asylum and approximately one-third of the children examined at New Haven, Conn., were similarly affected. According to investigators, susceptibility to upper respiratory infections is increased by rickets in children. It would be interesting to know whether or not rachitic pigs, lambs and other animals are more subject to pulmonary infection.

Some Poisonous Plants of California

L. H. PAMMEL, Iowa State College, Ames, Iowa

CALIFORNIA has considerable money invested in live stock. The dairy industry is a large and increasingly important one. The range industry, too, is large. The largely populated centers like the Bay region including San Francisco, Oakland and Berkeley, Los Angeles, San Diego, and the valley cities like Fresno, Stockton and Sacramento, need a large supply of milk and butter. In these regions the dairy cattle depend chiefly on alfalfa, barley and oats for pasture and forage. Consequently they do not come in contact with so many of the poisonous plants. Range cattle and sheep, on the other hand, come in contact with many poisonous plants. The matter therefore is important. No doubt there are many and serious losses from poisonous plants. I have made a somewhat hasty study of some of the poisonous plants found in California.

Injurious Grasses

Of the common wild oats of which there are two species, the common wild oats, (Avena fatua) is found in central and northern California, while the barbed oats (A. Barbata) is a common escape in southern California and the Bay region. Both of these species furnish most excellent forage and the rancher would be in a bad situation if it were not for these two grasses which cover the hills and pastures. During the early spring and early summer they furnish most excellent forage. These grasses are only dangerous when in the fruiting stage. The barbed awns and hairs sometimes cause an impaction and hair balls may form. The thing to do is to avoid this grass for the short fruiting stage. In the foothills and mountains there are several species of needle or porcupine grasses (Stipa) which are injurious because the sharp pointed callus of the "seed" works into the skin of animals, especially sheep. Range sheep often suffer from these injuries. These grasses in southern California bloom in February and continue to March, soon fruiting. In northern California they bloom in late March and early April. The common species of southern California is Stipa eminerus, and in the coast range of the Bay region, bear grass (Stipa setigera) is common, extending southward to southern California. Poison darnel (Lolium temulentum) is one of the European plants commonly naturalized in California. It has long been regarded as a poisonous plant. Stockmen should avoid pastures where the weed occurs. Another common poisonous grass, Johnson grass (Sorghum halapense) is widely naturalized in California. The fact that it produces one of the glucosides which is changed into hydrocyanic acid, one of the very strong poisonous substances, should be noted, and care should be taken to use the grass only in the right condition. Under very dry conditions it may produce most of this substance. It makes, however, fine hay and when cured is not dangerous. The same thing may be said in regard to Sudan grass, a most excellent forage plant.

Some complaint has come to me about the injuriousness of barleys. They are all troublesome and injurious grasses. They occur along roadsides and in waste places generally throughout California. One of the most common of these, the barley grass (Hordeum murinum) which is a native of Europe, occurs from the Sacramento, San Joaquin Valleys, the Bay region, southward to San Diego. It begins to be injurious from April and continues during the summer. It is injurious because the awns work into the sockets of teeth causing a pus infection. Another barley (Hordeum maritimum var. Gussonianum) is common through-

out the state. The meadow barley grass (Hordeum nodosum) is common in many parts of California, especially along roadsides in the mountains and foothills.

Hemlock and Cow Parsnip

Another poisonous plant has interested me very much, the poison hemlock (Conium maculatum). This tall branching European biennial with a disagreeable odor, divided leaves and white flowers, is common throughout California, in waste places, pastures, highways and fields. All parts of this plant are toxic. It is the source of the alkaloid conine, and was used by the ancients to poison Socrates, who died from its use. Were it not for the disagreeable odor, there would be frequent cases of poisoning in California to live stock. It is only when forage is scarce that cattle, sheep and horses eat it, and probably rarely. Several species of water hemlock (Cicuta Californica, and C. Bolanderi) occur in California, especially along margins of streams and in marshes. Occasional poisoning to stock is reported. Another poisonous plant of the family, the cow parsnip (Heracleum lanatum) is common in somewhat swampy places in the Sierras and on the coast, especially in the redwood forest region. This is a large, coarse plant with white flowers in umbels and large compound leaves.

Lupines

There are many lupines. One of the most important ones to bloom in March along the coast is the silver lupine (Lupinus albifrons) which occurs in the foothills of the coast range and Sierras. It has silky pubescent leaves and deep blue flowers. These appear in central California in March. Many other species occur and frequent trouble is reported to sheep. There is also one other somewhat common species that grows from 5-18 inches high. It has light blue flowers. This is the Lupinus micranthos and because of its abundance in the two interior valleys gives rise to some trouble.

One of the early blooming loco weeds of California has a yellowish white corolla and leaflets at first hairy, becoming greenish. This (the Astragalus oxyphysus) is common in the foothills and even occurs in cultivated fields. This species is reported as injurious.

Larkspur

There are several species of larkspur in California, one of the earliest of these to bloom being the coast larkspur (Delphinium Californicum) which has whitish flowers with palmately divided leaves. Another species is the Sacramento larkspur (D. variegatum) with bright blue flowers. The red larkspur (D. nudicaule) occurs in the coast ranges. It has red flowers. All of the larkspurs are very much feared by sheep rangers. It has been shown that they are all poisonous.

Many other plants of this family are looked upon with suspicion by cattlemen, like buttercup (Ranunculus sp.). These are very common in the valleys and in the coast country are abundant. Some mountain fields are yellow with their blooms. Baneberry (Actaea rubrum var. arguta) and the anemone, too, are listed and feared by cattlemen and sheep men.

The Lily Family

The lily family has a number of poisonous plants. Of these mention may be made of the camas plant. The most common species in the coast country, known as black grass nut (Zygadenus fremontii), has greenish white flowers, smooth elongated leaves coming from a coated bulb. The bulb is poisonous according to stockmen and the Indians regarded it as such. This species is common in the hills of the coast range. The death camas plant (Zygadenus venenosus) is a more robust plant with keeled leaves, greenish white flowers. This species is common on the coast north of Monterey and the Sierras. Sheepmen fear it. It is certainly poisonous. Dr. Jepson of the University of California reports hogs immune to it. The false hellebore or skunk cabbage (Veratrum Californicum) of the coast range in the Sierras is a very poisonous plant which contains veratrin and several other alkaloids. The camas plant (Camassia esculenta) with blue flowers commonly occurs in wet meadows. It has deep

seated bulbs. It is reported as poisonous by Dr. Jepson. It is especially common northward.

Dr. Jepson reports the perennial western hound's tongue (Cynoglossum grande) with broad petioled leaves and blue flowers as poisonous. The European relative contains a number of very toxic substances. This western species occurs in the foothills in shady places; it grows with the live oak and redwood.

Nightshade

Another most interesting group of poisonous plants belongs to the nightshade family. Of these one of the very weedy plants in southern California, less common northward, is the smooth tobacco with yellowish flowers, a smooth green leaf and a disagreeable odor. This is so frequent in the foothills of the coast range of southern California and along the coast that some cases of poisoning are recorded. The odor of the plant makes it a deterrent to stock. Several poisonous thorn apples (Datura meteloides, D. tatula, and D. stramonium) are not uncommon in many parts of California. The thornapple contains hyoscyamin and acts as an inebriant. Of the nightshades (Solanum nigrum var. douglasii), the somewhat shrubby blue flowered species (S. umbelliferum) is common in the foothills and no doubt produces some injury to sheep.

Buckeye

The California buckeye (Aesculus Californica) with palmately compound leaves and white flowers is abundant along little brooks of the coast ranges and in the Sierras. Cases of poisoning were reported to me. It is said that sheep eat the seed in the fall and are poisoned.

Urticaceous Plants

I may report here an interesting item about the California hard maple (Acermacrophyllum). It is well known that this maple has large leaves, roundish in outline, the young stems milky, the flowers yellowish, and after flowering the fruit is produced. This is known as a samara or key fruit. The body of this fruit is densely hairy. A short time ago I saw a tree with the old ripe fruit hanging on it. I picked some of the samaras and received a stinging sensation which lasted for more than 4 hours. The sensation was as pronounced as the stinging nettle. This should be added to the urticating plants.

There are a number of other plants of the Borage family which though not strictly urticaceous produce mechanical injuries. Some of these are especially common in grain fields in central valleys of California. One is known as fire weed (Amsinckia tesselata), the other is buckthorn weed (Amsinckia intermedia). The former is called fire weed because of the yellow color of the flowers. These plants are covered with stiff hairs, the base becoming hard. The dry bristly leaves during harvest time break up and the bristly hairs are especially troublesome to the eyes. Stock when feeding on this ripe barley and wild oat straw are troubled in a similar way.

Several of the true nettles are most troublesome, one of these, the stinging nettle of Europe (Urtica urens) is common in the foothills in woodland pastures, also throughout southern California. Two native species with much larger leaves, the Urtica gracilis var, halosericea occurs in moist valleys throughout the state. It is thoroughly urticating. U. Californica is a much coarser plant with hispid stems and a grayish color. It is common in the coast country. This is also urticating.

The poison oak (Rhus diversiloba) is common in all parts of California except the high mountains. It may be seen adjacent to fences and in woods. In the spring the leaves have a reddish tinge.

The Rose Family

The rose family has a number of poisonous plants. Of these we may mention the choke cherry (Prunus demissa) which resembles the eastern choke cherry. This is found in the Sierra mountains and would be most destructive during the summer when grazing occurs there. Probably the Prunus ilicifolia, an evergreen shrub of the coast range, especially southern California, is poisonous. It is

well known that the hard tack (Cercocarpus paroifolius) of the coast range, and mountain mahogany (C. ledifolius) of the Sierras and coast ranges contain larger quantities of hydrocyanic acid, like the choke cherry, and are particularly injurious to grazing animals.

Milkweeds

Another interesting group of poisonous plants occur in the milkweed family. Two of these species of the genus Asclepias are said to be especially poisonous, one the narrow-leaved milkweed (Asclepias Mexicana) which is closely related to the eastern species and the milkweed (A. eriocarpa). The former has small greenish white flowers tinged with purple, and occurs in patches in the valleys of California. The second species has creamy white flowers in umbels and with the hairy leaves in whorls. Our eastern A. speciosa is also common and this has pink or reddish flowers and rather large leaves which at first are pubescent. This is known to be poisonous in Iowa.

Brake

Another interesting poisonous plant, the common brake (Pteris aquilina) is common along the seacoast and in woods. It has long been recognized as a poisonous plant. It is abundant in woods and is grazed; no doubt it often causes poisoning to sheep and cattle. It is never found in the open dry country but in the moist valleys, and coast country near the ocean, associated with low shrubs and small trees.

Ragwort

In the east there is much trouble from ragwort or groundsel or "old man of spring" (Senecio aureus). In the Mississippi valley and Rocky Mountain country this plant is seldom seen but in California it is an extremely common weed everywhere on highways, fallow fields and orchards. It is generally regarded as a poisonous plant. This plant is related to the dandelion. It has a simple stem from 6-12 inches high and yellow flowers.

Poppy

Another common plant of California especially in fallow fields, foothills and mountain ranges, is the California poppy (Eschscholtzia Californica) with conspicuous yellow flowers. It is regarded as poisonous. This has the same effect as the poppy plant. The cockleburs, of which two species occur in California (Xanthium canadense and X. spinosum) produce not only mechanical injuries but the young seedlings are poisonous. The former weed is especially common near irrigation ditches and along streams. Other poisonous plants are the sheep sorrel (Rumex acetosella, azalea (Rhododendron occidentale), California rose bay (Rhododendron Californica). These occur in the mountain ranges. The Labrador tea (Ledum glandolosum) is found in the high mountain ranges of the state.

The matter of poisonous plants of California is very important to the stock industry and veterinarians should give the matter some attention so that more definite information may be at hand.

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WHITE SNAKEROOT

A man at Coon Rapids, Iowa, sent in a specimen and a clipping from a local paper in regard to white snakeroot as follows:

Snakeroot Kills Cattle

"White snakeroot is a poison plant that is causing some loss to cattle owners in Iowa this year (1925), according to reports which have been coming in to Iowa State college. A number of calves recently died in a pasture near Avoca as a result of eating white snakeroot.

"Flowers of white snakeroot are white, about one-fourth to one-third inch in diameter and are produced in clusters. The plants grow from two to three feet tall. The leaves are two to three inches long and are ovate in shape. White snakeroot is related to boneset, a plant the pioneers used in making a tea for medicinal purposes. It is very common in wooded pastures and is found in almost every part of the state. If there is fear of this plant being present, cattle should be kept out of wooded pastures.

"Cattle have consumed the plant this year partly because of the dry weather and resultant short pastures, according to Dr. L.

H. Pammel, head of the botany department, Iowa State college. Cattle are said to show trembles when poisoned by white snakeroot and the milk from cows eating this weed is considered injurious to man.

"Any farmers who have pasture plants they suspect are snakeroot may find out through their county agents or by sending in the suspected weeds to the botany department, Ames, Iowa."

This correspondent writes: "I cut the enclosed from my local paper and had a fear the plant I am sending might be the snakeroot. It is growing in my raspberries in town and has been for several years. It seems to be increasing, though my wife gathers the bloom and places in her table bouquets."

This is the snakeroot and will do no harm when placed in bouquets. The harm done is when the plant is consumed with other forage plants.

Infant Mortality in Swine—Cause and Prevention*

A. T. KINSLEY, Kansas City, Mo.

THE BASIC PRINCIPLES of successful swine management have been detailed in previous issues of Veterinary Medicine, and a brief discussion of some specific conditions resulting in pig losses will follow.

Losses Due to Improper Swine Management. Abortion

Extensive pig losses have occurred in many swine herds as a result of abortion. Abortion may be accidental, non-specific and infective. The causes of accidental abortion are varied and may or may not be the result of improper swine management. The losses of pigs from accidental abortion are not large and therefore of little consequence. Non-specific abortions may be caused by improper feeding but occurs more commonly as a sequel of diseases in which there is a high temperature such as swine flu and hog cholera.

Pig losses due to an attack of swine flu during pregnancy resulting in abortion, still births and the death of pigs with low vitality soon after farrowing, have been enormous in some sections of the country. Some breeders lost 80 or 90 per cent of their spring farrow in 1918 and 1919, the losses being attributed to an attack of swine flu during the gestation period. If the swine flu is relatively virulent, a large percentage of the pregnant sows will abort rather promptly but if the disease is mild the pigs are usually carried full time but most of them are weaklings and die soon after farrowing.

Pregnant sows usually abort as a result of acute hog cholera unless the sow dies before this accident occurs. Abortion does not result from the simultaneous injection of potent anti-hog-cholera serum and virulent virus into pregnant sows regardless of the stage of pregnancy provided the sow is properly restrained while being vaccinated. Losses of pigs due to the occurrence of cholera in brood sows are preventable. Brood sows should be immunized against cholera before they are put into the breeding pens.

Specific infective abortion in swine designates a condition that is apparently transmitted from animal to animal in a herd and assumes the characteristics of an infective disease. This malady has been quite prevalent in recent years and has exacted a heavy toll from the swine breeders. Specific infective abortion in swine is caused by microbian invaders of which the B. abortus Bang is the most frequent offender. Reports are available

* Continued from April issue.

in which it has been demonstrated that an aborting sow may be transferred from an infected herd into a herd free from this disease and establish abortion in that herd. The boar may also disseminate the infection of this disease.

Some sows that do not abort may be carriers and disseminators of this infection. It is very probable that contaminated feed may be a source of infection. The permanency of this infection on a premise has not been determined. If the infection is not easily and readily destroyed by exposure to atmospheric and climatic conditions, then barnyard fowls, pigeons, dogs and vermin must be considered a means of carrying the infection. Bovine infectious abortion is closely related if not identical to porcine infectious abortion. Some instances seem to indicate that the disease may be transmitted from cattle to swine.

Pig losses incident to specific infective abortion in swine can be reduced to a minimum and ultimately eliminated by proper herd management. Sows that abort should be isolated and the premises occupied by them at the time of the abortion should be thoroughly cleaned and disinfected. Brood sows should not be maintained in lots or yards that connect or communicate with cattle yards in which aborting cows are maintained. Milk from aborting cows should not be fed to sows unless it has been boiled. Sterile and non-breeding sows should be kept separate from the regular breeding herd. The successful control of infective abortion in swine will eliminate one of the principal causes of pig losses, and is dependent upon the destruction of the infection in hog houses and lots, together with proper disposition of aborting sows and known abortion infection carriers.

Losses of Pigs Due to Metritis

Extensive losses of pigs have occurred as a result of inflammatory and other disturbances of the uterus. Metritis in sows appears to have become quite prevalent during the last few years, probably because of more intensive breeding. This condition is usually a sequel of abortion or difficult parturition, although it has been observed in sows in which parturition was apparently normal. Some gilts, bred and unbred, have been observed that showed marked evidence of metritis. In one herd in which there had been extensive pig losses this condition was demonstrated by autopsy in several gilts.

The cause of porcine metritis is undoubtedly infection and a variety of microbian agents may be capable of producing the condition. Pyogenic cocci, B. abortus and representatives of the colon typhoid group are the most common offenders.

Pyemic arthritis, a condition that causes the loss of hundreds of pigs, is usually a sequel of metritis in the sow. Polyarthritis may have its origin from infected genital organs of the dam and some cases of infective pig scour are the result of infection from a contaminated uterus. One of the principal evidences of uterine infection in sows is the occurrence of one or more runts in each litter of pigs. Although runts do not necessarily die soon after farrowing and are usually not considered a loss, it would be more economical if they were destroyed at the time of farrowing as they do not develop properly. The occurrence of runts is an economic loss that can be avoided by breeding healthy sows.

Milk From Diseased Udder Injurious to Pigs

Good brood sows have from ten to twelve well developed mammae. Inflammation and other diseased conditions may affect one or several of the individual glands. The location of the mammae, in the sow, predisposes them to injury and infection.

Porcine catarrhal mammitis or garget is relatively common and although this condition is not serious in the sow the milk from the diseased udder may produce disorders that are fatal to the pigs. The usual cause of garget is retention of milk and occurs in sows that have lost some or all of their pigs, or after weaning, although it may occur in extra-heavy milk producing sows that have normal

litters. This condition may affect only one or a few of the glands but in some instances they all become affected. The occurrence of garget at the time or within a few days after farrowing is quite serious because the young pigs are ready victims of digestive disorders and diarrhea and a large percentage of them die.

Pig losses occasioned by garget in the sow can be reduced to a minimum. The primary cause of garget is retention of milk and to prevent it heavy milkers should have their feed reduced and be hand milked when occasion demands.

Agalactia in Sows and Loss of Pigs

There have been many reports of individual cases of the sudden cessation of milk production in sows, and there have occurred several instances in which agalactia developed in from eight to twelve sows on one farm within a few days. This condition is of importance because it results in the loss of numerous suckling pigs.

Interesting information on metabolism and reproduction has been revealed by recent physiologic research. The functioning of the endocrine glands is very important in relation to metabolism and the reproductive functions. The development of the mammary gland at puberty is dependent upon a hormone produced by the ovary, and the growth of the mammary gland just prior to parturition is the result of a hormone produced by the fetus.

The exact method in which the mammary gland cells produce milk is not known. The stimulus for milk secretion may be an internal secretion in part but the principal factor is suckling or milking. The injection of placental extract is said to be capable of stimulating milk production.

Agalactia is usually a symptom of parenchymatous mammitis, and whether temporary or permanent depends upon the intensity and duration of the inflammatory process. The agalactia that has been reported in sows does not appear to be associated with any inflammatory condition of the mammae. Most cases occur within from three to five days after parturition and the first indication of the disease is the gauntness and weakness of the pigs and their persistent attempts to obtain milk. The cessation of milk flow does not appear to have any relation to the feed of the sow, as the condition has occurred under all conditions of feeding.

Age, breed and condition of the sows are apparently not causative factors and it is therefore probable that the primary cause of agalactia is some disturbance of the endocrine glands. Agalactia causes the loss of many pigs and this loss can be avoided by prevention and proper treatment.

It is empirical to attempt to prescribe either a preventive or a curative treatment of agalactia without knowledge of the specific cause. However, maltine and other like products are highly recommended for a similar condition in women and should be given a trial. Ground or cracked barley soaked for 12 to 24 hours, the length of time depending upon the temperature, makes a splendid substitute for maltine and is relatively easily prepared. No doubt, the barley is of much more value as a preventive than a curative agent. It is possible that if soaked barley was fed for a few days prior to farrowing and for two weeks thereafter agalactia would not occur. Extracts of placenta and mammary gland have been used for the stimulation of the mammary glands in woman and are a possibility for cases of agalactia in sows. Treatment should begin early in these cases.

The demand for milk goats is apparently increasing. A good milk goat should produce about four quarts of milk daily and one such goat can be practically maintained on kitchen scraps and lawn clippings of a private residence. In some localities goats are rented for $5.00 per month and it is apparent that if an interest in goat milk could be stimulated in a community the renting of goats would be profitable, not only to the consumer but also to the renter.

Tattooing Hogs as a Method of Tracing Disease

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THE FOLLOWING DISCUSSION of the tattoo method of marking hogs is contributed at the suggestion of "Veterinary Medicine." A recent reference to this development in livestock-sanitary work appeared in a paper by Dr. John R. Mohler, Chief of the Bureau of Animal Industry, in discussing the relation of veterinary work to livestock production. The tattooing of hogs is essentially a means of identifying them positively on post-mortem examination. Experience in packing-house procedure shows that most marks applied to hogs, including ear tags, paint marks, chalk marks, and the like, disappear before the hogs reach the post-mortem inspectors in federally-inspected establishments. Consequently when lesions of diseases are found it is difficult and often impossible to identify the farm or locality from which the hog was shipped.

The tattoo method here described aims to supply the necessary information. In experimental work conducted by the writer, in cooperation with other Federal veterinary inspectors, the importance of a method that was simple and rapid as well as leaving a permanent mark was obvious. An instrument which appears to satisfy the requirements fully consists of a metal holder, slotted to receive blocks of Babbitt metal in which the tattooing points are set. The blocks measure three-fourths of an inch by one inch and the points, which are ordinary steel phonograph needles, are embedded in the metal in its molten state. The points of the needles are about one-eighth of an inch apart and form numbers and letters. The blocks have shoulders which fit the grooved holder, thus permitting them to be used in various combinations. A thumb screw holds the last block in place.

Operation is Simple and Rapid

The tattoo instrument measures about 18 inches long and with the blocks in place ready for use weighs approximately 2 pounds. The method is both simple and rapid. To apply the tattoo the operator merely strikes the hog smartly with the instrument. Hogs tattooed within 36 hours of time of slaughter show the tattoo mark plainly on their dressed carcasses even when no pigment is used.

One stroke of the instrument applies the tattoo mark. Extensive tests have shown that the tattooing is successful regardless of age, size or color of the hogs.

The tattoo characters appear in red, due to slight capillary hemorrhages on the white background of the skin. When hogs are tattooed on farms several weeks or months before slaughter a pigment is necessary. The marking material found to be most practicable for tattooing, as well as being cheap and easily obtained, is ordinary black automobile enamel. An ordinary brush, such as a round stencil brush, is used for applying the pigment to the tattoo points. A half pint of enamel will tattoo approximately 100 hogs.

Owing to the thickness of the hide and the underlying layer of fat that contains few nerve ends, the act of tattooing appears to cause no pain even though the tattoo points enter the skin approximately one-fourth of an inch. In the experimental work involving about 8,000 head of swine most of the animals merely grunted or humped their backs when tattooed; very few squealed. Some experience is necessary in applying the mark, the main point being to apply the tattoo with more force to an old hog having a thick, tough hide than to a young animal whose skin is thinner and more tender.

So far as the meat trade is concerned there have been no criticisms or adverse comment regarding the appearance of the tattoo figures on the carcass. It is desirable, however, to put the tattoo mark on the shoulder or forepart of the animal rather than on the hams or other valuable cuts. Inquiry on this subject among livestock buyers and packers has revealed no objection to the mark but, on the other hand, exceptional interest in tattooing as a means of reducing losses from disease.

Tattoo mark as it appears on the dressed carcass of a hog. The letters are about three-fourths of an inch high and may be seen easily at a distance of ten feet.

Use in Disease-Control Work

Following is briefly the plan of procedure in tracing tuberculosis, for instance, to the original source of infection. When hogs are sold to a packing plant the man in charge of the scales applies a tattoo mark to each lot of hogs, giving each shipper a separate number. The records show the date of sale, number of hogs shipped by each producer, name and address of each producer, and the corresponding tattoo mark. Later when the carcasses come before the post-mortem inspector he notes, on the form used in making post-mortem reports, the tattoo number of each hog in which diseased conditions are found. A comparison of killing-floor records with those made at the scales makes the tracing of infection to the source extremely simple. The inspector assigned to trace the disease has in his possession the producer's name and address, date of sale, number of hogs delivered, tattoo number, and a report on the nature and extent of lesions as shown by post-mortem examination.

Already the method of tattooing has resulted in tracing tuberculosis of hogs to a number of farms and in detecting the disease both in the cattle and poultry on such farms.

In the cooperative shipment of hogs the practice of tattooing not only establishes ownership but makes possible the proper payment to each producer on the basis of healthy hogs shipped. In one instance where the tattoo method was used two stockmen had shipped hogs which failed to pass the post-mortem inspection. Formerly losses had been prorated among all the shippers, but through the aid of the tattoo device all the shippers who had marketed healthy animals received the full payment and those who shipped tuberculous hogs were paid accordingly. Such a plan places an obvious premium on the production of sound, healthy livestock and is also an incentive for persons having disease among their animals to eradicate it.

The tattoo method also offers possibilities in certain lines of experimental work and in the production of biological products when it is desirable to identify positively the dressed carcasses of the hogs used in the production of such products. The tattoo mark does not show on live animals, but has its greatest use as a

means of establishing the identity of dressed carcasses. The method described represents a development of approximately 5 years. Further particulars, including illustrations of the device, are contained in Miscellaneous Circular 57, "The Tattoo Method of Marking Hogs and Its Use," recently issued by the Bureau of Animal Industry, U. S. Department of Agriculture.

The cost of a complete tattoo marker, including the necessary numbers and characters, has been about $10 each for the experimental sets. The instrument is practically indestructible when properly used. Since the device is not patented there are no limitations concerning its manufacture and use, but in the interest of disease-control work and the systematic development of tattooing it is suggested that all persons using the method report their results to the Bureau of Animal Industry, U. S. Department of Agriculture.

Alimentary Parasites of the Dog

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ONE OF THE MOST frequent of the common ailments of the dog is verminous infestation of the alimentary or digestive tract, a condition usually alluded to as "worms." The very word seems to be an obsession with some people, for they imagine this to be the root of almost every departure from normal health. Not infrequently, perhaps, they are correct. In an immense number of cases treatment for worms has been already adopted by the mystified owners long before the services of a veterinary surgeon are sought, and occasionally this "hit or miss" course has appeared to justify itself. On the other hand, there is not the slightest doubt but that many puppies are killed annually as a direct result of the administration of vermifuges—in excessive doses, all too frequently applied.

It is certainly true that a large percentage of dogs are the hosts of some kind of parasite, yet there seems no justification for the assumption that all members of the species should be regularly dosed irrespective of whether evidence does or does not exist of the presence of these pests. One might even withdraw objection to such periodical dosing if some assurance were forthcoming that the drugs chosen, their dose, their mode and frequency of administration, and their appropriateness to the particular worm, were rational and well understood. Individual weakness or idiosyncrasies must also be taken into account, for in this, as in some other matters, what is one dog's meat is another dog's poison.

It is a not uncommon experience to be told by owners that they have tried every preparation known to them, without the slightest success in extracting worms. It never seems to occur to such persevering folk that their diagnosis may have been hopelessly at fault. They hold the opinion that if a vermifuge is given it should produce worms. Such remedies do not, however, **create** worms. I have known several instances of direct and irreparable damage following the giving of worm cures owing to the owner's inability to discover what really ailed his dog. On the latest occasion, a request was made that some pills should be forwarded by post, as the gentleman was sure his dog had worms. He cured the dog all right, for next day it was dead, and a post-mortem examination revealed the presence of an acute enteritis. A purgative given under such circumstances could, of course, have had no other result. A professional examination of that animal for the purpose of diagnosis would have prevented such a loss. Nor is this by any means an isolated case.

As was said above, many people be-

come obsessed by the idea that their animals are worm-infested, and they cannot resist trying all sorts of remedies and experiments upon their unwilling patients.

The dog is liable to be attacked by a considerable number of parasites—both large and small—and of all the domesticated animals he is perhaps the most pregnable. This is not by any means to be wondered at when one considers his dangerous and never-failing habit of sniffing the ground, especially after some other dog has passed by. His readiness, too, to consume all sorts of garbage and offal render him especially vulnerable to infestation; though I know that some will affirm **their** animals to be epicures. Some are indeed dainty, but I speak of the majority. These, then, are a few of the methods of infestation. Yet I am aware that in some minds an objection will be raised to this statement on the score of the impossibility of a dog, which has never been out in a public place, or had anything but the freshest of beef to eat, contracting worms. How, they say, will this be explained? Well, in the first place, it appears to have been fairly well established that a puppy may be born with worms, in one or other stage of development. In support of this somewhat astounding statement I might here quote an extract from a paper recently read before the Annual Congress of the National Veterinary Medical Association by Dr. Thomas Cameron, M. A., a prominent veterinary helminthologist. Alluding to the roundworm, he said: "Ascarid worms are present in all of our domestic animals, but the cattle form is of little importance in this country, and in sheep, ascarids are found so seldom as to be negligible. In pigs, horses, dogs, and cats, however, it is one of the commonest and most prevalent parasites throughout the world. Recent work has shown that the life-cycle of all forms is essentially the same. An unsegmented egg is passed in the feces. After some weeks' exposure to oxygen a small embryo develops, but does not hatch until the thick-shelled egg is swallowed by the host and the embryo is liberated. The larva leaves the digestive tract for the blood stream, and in four to six days after ingestion it reaches the lungs. Owing to its size it is too large to pass through the lung capillaries, and accordingly it breaks through the air spaces, passes up the trachea, and is for a second time swallowed. Apparently any species of ascaris will develop thus far in any host. Ortlepp has even found that snake ascarids will reach this stage in mice.

"If the host is not the correct one, the larvae are passed to the exterior in the feces; if it is correct, they develop to maturity in the intestine.

"During the passage through the lungs, small areas of inflammation are caused, and if the larvae are numerous, a pronounced verminous pneumonia is set up. The animal may die, or, if young, may have its growth at a very critical period seriously retarded. This has been found to be the case particularly in pigs, and has explained many cases of lung trouble and stunted growth in young animals."

From the foregoing it will be appreciated that if a pregnant bitch becomes infested with the eggs of roundworms her bloodstream will eventually become the temporary habitat of the embryonic parasites; and since the unborn fetus is supplied with this same blood, the new-born puppy may contain the seeds of a new generation of worms which—to the astonishment of the owner—very soon begin to manifest themselves. The extracted statement also affords an explanation of the short cough which so often accompanies an infestation of worms. So far as I am aware, the cough had hitherto always been attributed to reflex action caused through the irritation set up in the distant bowels. Nor does either explanation of the cough controvert the other. Both are equally possible. It is probably quite well known that irritation of one organ may engender a distinct reflex disturbance in some other distant part, a good illustration of which is the vomiting which frequently occurs in dis-

eases of the uterus, kidneys, and other far-away organs.

We have seen, then, how it is possible for a newly born puppy to commence its career with an unenviable legacy of trouble. Rigorous measures may be adopted for the expulsion of all worms, which feat may be accomplished perfectly satisfactorily. Then after the lapse of some time the dog seems to be as badly infested as ever. Owners are apt to become impatient, and if a veterinary surgeon has been in attendance, it is quite likely that he will get the full blame for the recurrence of the trouble, his methods or his drugs probably coming in for destructive criticism. But the fact frequently is that the dog has become reinfested in the very same way that he was originally infested. A puppy is easily infested by its mother, if the latter happens to harbor worms, for a puppy's tongue is nearly always in direct contact with its mother's skin, and this, in the region of the tail (the hindermost mammary glands), is most likely to be the temporary habitat of worms' eggs.

Every parasite passes eggs or larvae, which in shape, size, color, etc., are characteristic to the particular worm voiding them; although these may be almost or wholly invisible to the unaided human eye, they are nevertheless there, and are the actual cause of all infestations. Adult dogs, by their habit of licking each other, pick up these eggs in a precisely similar way. The feces of infested dogs are often teeming with eggs, and there seems every reason to suppose that where the early and complete removal of such excreta is neglected, some of it will be carried long distances on people's boots or dogs' feet, to spread its baneful influence in quarters that were probably hitherto clean. Thus, in one's endeavor to prevent a dog or a kennel of dogs from becoming affected, attention must be paid to this fundamental principle of hygiene. Dogs cannot manufacture worms from their own tissues spontaneously. If they contract them at all, it is through direct or indirect infection from some previous case.

It must not be forgotten that the dog louse and dog flea play an important part in the spread of tapeworm (at least one species of tapeworm, in whose life-cycle they take the rôle of intermediate host), for these insects consume such worm eggs as they may find adherent to the dog's coat or skin, and become in turn consumed by the animal in its biting and nibbling endeavors to alleviate their irritation. Thus, an egg-bearing flea or louse which may gain access to a clean dog's body passes on the trouble where otherwise none might have existed. In deciding what measures shall be taken for the prevention of infection, therefore, the wholesale eradication of skin vermin from a kennel and its inmates is one of the first matters which should be thought of.

Since it is possible for those with the requisite knowledge to determine the type of worm present from the character of the ova, it is only then necessary to consider the life-cycle of that particular parasite to apply adequate measures for the prevention of infection. It is insufficient to state merely that the infesting parasite is a nematode, cestode, hookworm or fluke, because each genus is composed of numerous species, the life-cycles and the reactions to various anthelmintics of which may vary in a marked degree.

The roundworms which affect the dog are usually the Ascaris marginata or the A. mystax, although the latter more frequently is found in the cat. The life-cycles of these worms have been already considered, and will have been found very much more simple than those of the tapeworms now about to be described.

Unlike the roundworm, the tapeworm must have an intermediate host in its development, and in some cases man becomes the intermediate host, much to his discomfort and occasionally to his danger. The cestodes or tapeworms grow from one parent or head scolex and adhere together in a long ribbon-like colony. The head is provided with hooks and suckers,

by which it becomes attached to the lining membrane of the bowel. The segments nearest the head are the youngest and smallest, becoming larger and more mature as they recede from the head, so that finally when they are fully developed they separate from the parent parasite and become voided with the feces.

Each detached segment is complete in itself, having both male and female genital organs. They fertilize themselves and produce great numbers of eggs. When the segments are passed out, they eventually disintegrate, setting free their contained ova, which later become ingested by a dog, fox, man, or some other mammal. Each egg contains a six-hooked embryo, and so soon as it is swallowed and reaches the new host's stomach, this embryo is set free by the digestive action of the gastric juice. It then fastens itself to the bowel wall, through which it very soon passes to form a sac-like cyst in some adjacent organ. This cyst is sometimes termed a bladder worm, for within it is found the head of a tapeworm completely furnished with hooks and suckers. It is now necessary, however, for this bladder worm to be swallowed by a secondary host, in the stomach of which the head or scolex is finally liberated and becomes a breeding parasite; and so the cycle continues.

The bladder worm of the Taenia serrata is found in the liver of the wild and domestic hare; that of the T. marginata is found in the serous tissues of the sheep, cow, goat, pig, squirrel, monkey, and sometimes man; the larval stage of the T. coenurus is located usually in the brain of a sheep; and the primary stage of the T. cucumerina (very common in the dog) is in the abdominal cavity of the dog-louse and flea, and in the flea of man.

All these tapeworms are, together with the T. serialis, T. litterata, and T. echinococcus, found naturally in the dog. In view of the formation of bladder-worms on the lights, entrails, and other parts of the food animals, it will be seen how risky it is to feed dogs on such uncooked offal. Raw beef is safe enough, and plays no more part in infesting dogs with worms than does milk, although both are frequently blamed.

Of all the tapeworms the longest is the T. marginata, and the smallest the T. echinococcus, their maximum lengths being six yards by one-fourth inch respectively. The last-named is also very dangerous to man owing to the possibility of his consuming its eggs, for in this case the cysts which become formed upon his liver or peritoneum may grow to such an immense size that death is the result. Quite recently an inquest was held upon a lady who was said to have contracted echinococcus cyst from her dog. But fortunately the incidence of this worm in dogs is very rare. Generally speaking, however, there is little or nothing to fear from the dog so far as worms are concerned, because if the embryos find themselves in an unsuitable habitat they are passed out with the feces.

The symptoms exhibited by worm-ridden dogs are, briefly: A capricious or changeable appetite; rough, staring, or lustreless coat; a tendency for puppies to become pot-bellied and for adults to become lean; puppies, although rotund of abdomen, are not necessarily fat, for they often show a marked loss of flesh in other parts of the body. Occasionally there is present a slight husky cough (already alluded to), and more frequent than any other symptom is perhaps the cutaneous irritation. Restlessness is sometimes observed, and not infrequently a dog sitting quietly one moment will jump up and run as though stung by a bee. This behavior I attribute to some sudden tickling or stinging sensation experienced in the rectum or other lower bowel. The dragging of the anus along the ground is also prompted by low irritation, although anal irritation is not by any means a symptom diagnostic only of "worms." When a dog does this sort of thing one's attention should first be directed to the condition of the anus itself. In the dog a gland is situated on either side of the anal ring, and if these become occluded from any cause, they set up intense irritation, to

appease which the dog rubs and licks the region, thereby making the condition far worse. Vomiting occasionally occurs, roundworms being ejected in the vomit, and be it noted that only the ascarids are concerned in this process, as they alone seem to be sufficiently mobile to gain access to the stomach. Their presence in this organ is the only cause for the vomiting, and probably were it not for the fact that a dog can vomit at will, they might not even then excite the act. Doubtless a dog is able to appreciate the presence of any foreign content in its stomach, such as wriggling worms or irritating blades of grass, and acts accordingly. All these symptoms may be manifested singly or collectively, in mild or in aggravated form. In most cases I am convinced that worms do not cause half the trouble which is believed of them, but of the two main types of worm the tape variety would be probably the greater nuisance.

In a number of cases, however, the symptoms are exaggerated, and in addition to what have already been enumerated, we may find a distinct intestinal catarrh—almost amounting to inflammation—in which diarrhea is an accompaniment. In others, nervous phenomena may supervene, the puppy being thrown into convulsions.

Finally, badly infested animals, or those infested for a long time, may show marked anemia and emaciation, and become permanently stunted in their growth and weakened in constitution.

Space and other considerations forbid the detailed discussion of treatment, but it may be stated that this question goes far deeper than the mere administration of a potion on an empty stomach. In the first place, worm remedies are divided into vermicides and vermifuges. The former are said to kill the worms, whilst the vermifuges expel them alive or dead. Most ordinary purgatives are also vermifuges, for any drug which causes a flushing of the bowel drives the parasites to the exterior along with the feces. Nowadays the action of both types of remedy is obtained from one combination, thus rendering the process safer for the dog.

Many anthelmintics are selective in their action—that is to say, whilst one drug will single out the tapeworms, another will be ineffective against them, but will be fatal to roundworms. The much-vaunted carbon-tetrachlorid, for instance, is of most use against the hookworm, a parasite which is more or less rare in this country. The mode of administration is also of great importance, and should be considered in conjunction with the nature and habitat of the parasite to be expelled. To quote again from Cameron: "Olive oil has been found by Hall to increase the solubility and consequent toxicity of chenopodium for dogs, whereas castor-oil distributes the drug throughout the intestine much more quickly, is much less toxic, and much more efficient. Male fern has been found by the same worker to be much more dangerous to dogs without castor oil than with it—probably because efficient purgation is essential if absorption is to be avoided."

One could continue giving such illustrations ad lib., but sufficient will have been said to prove the necessity for due consideration of the choice of drug and the vehicle in which it is conveyed. "To be given on an empty stomach" is the usual direction on the label, but we should realize what this really means, and why it is so important. Obviously, if a dose of liquid medicine or a pill be added to a stomach full of food, it is greatly diluted by such admixture, and is prevented from exerting its full power upon the parasites which may be therein. Furthermore, solid food and mucus afford a mechanical protection to the worms, which would not exist had the animal been duly starved. Many people are known to believe that the object of starving the dog is so that the parasites may also be starved. Then, at the first sign of some material being swallowed, all the worms would, so to speak, look towards the entrance with open mouths, ready to exact their due

share of anything imbibed by the host. This idea is, of course, ludicrous and quite incorrect.

Shortly summarized, the objects of starvation are to prevent too rapid absorption of the drug given; to get it in contact with the parasites in as concentrated a form as possible, and to give the latter no protection from its lethal effect. Food should be withheld for 24 hours before administering a vermicide.

Removal of some worms at the first dose is an indication that the dose should be repeated in about five or six days' time, and so on until no more worms are voided. So far as tapeworms are concerned, unless the heads are passed, complete eradication has not been effected.

Hematic Filariosis of Dogs

A. R. ROWAT, Honokaa, Hawaii

Internal Parasites

OF ALL DISEASES to which dogs are subject, I believe internal parasites cause the greatest trouble; more especially is this true in the case of young dogs and puppies. The life history of parasites making the alimentary tract their habitat is now very well understood, as well as the annoyance that accompanies them. Thanks to scientific research in recent years by men devoted to the subject, therapeutic measures have been discovered that will successfully combat all of these pests if directions are properly followed, and the list of drugs that are effective has been greatly reduced as compared with the line of treatment made use of in the early days of veterinary science. Internal parasitism outside of the alimentary tract, however, has not been so successfully studied, neither as regards the life history of the parasites nor the best methods to fight them.

In this article I shall deal with a disease of dogs that is common in most parts of these islands and with which considerable experience has been gained in the last thirty-eight years.

Hematic Filariosis

This disease is caused by the invasion of the heart worm (Filaria immitis) that apparently has a natural or selective affinity for the cavities of the right heart, is often found in the pulmonary artery, and has, it has been reported, been found occasionally in the connective tissues.

The life history of this worm is somewhat obscure, but the theory generally accepted is that the mosquito when sucking the blood from an infected dog takes the embryo of the worm into its system where certain changes probably take place; later the mosquito seeks a pool of water in which to deposit its eggs and there dying, the embryo is released and probably finds a new host in some fresh water insect. A dog drinking from this pool swallows the larva of the heart worm which in due time enters the circulation and eventually follows its course to the right heart as its final habitat. I read an article a short time ago in a local newspaper that would completely disprove the foregoing theory; it said that Airedales were practically immune to heart worm owing to their thick, wiry coat protecting them from the mosquito. This would lead one to believe that the mosquito carried the infection directly to the dog, whereas the generally accepted theory is directly adverse. An elementary knowledge of parasitic evolution leads me to believe, from analogy as well as from observation, that the heart worm cannot reach maturity without the intervention of an intermediary agent.

I first heard of this parasite about forty years ago when a paper on the subject by the late Jas. Brodie, V. S., had been sent

on from Honolulu and was read before the Veterinary Medical Association of the Montreal Veterinary College; there also was a photo of a dog's heart that had been slit on the right side to show the entangled worms in the auricle.

Symptoms

The symptoms in different cases vary greatly. One animal may display a certain class of symptoms, whilst the next case may have symptoms of an entirely different character, and development of the disease must be closely watched before a correct diagnosis can be made. Suspicion that the disease is present should lead one to make a microscopic examination of the blood which should show many embryos if the animal is affected. The first symptoms are usually that the dog is unthrifty, off his feed and this will soon be followed by other indications, one of which is a peculiar cough that is characteristic of heart worm; a fit of coughing is followed by attempts to vomit but nothing is brought up except strings of ropy saliva. The animal may then be quiet for quite a while before the next paroxysm occurs, but usually they are of frequent appearance. Lameness in one limb without pain on pressure may be the only sign of this disease. In other cases the symptom most apparent may be great fatigue, the animal on the slightest exertion going into a fit that prostrates it for a short while but from which it usually recovers; a quick run after any object will bring on these temporary paroxysms. While the dog is quiet this symptom is never observed, but when it is observed a suspicion of heart worm should be aroused. Apparently severe pain evidenced by the dog sitting on its buttocks with nose elevated and howling continuously may in some cases be the only feature. Anemia is one of the most conspicuous signs and may be looked for in the early stages of the trouble. Abdominal dropsy is nearly always present as the disease progresses, and when it does occur the case may usually be considered past recovery. Intermittent heart beats are always noticed in aggravated cases.

Post-mortem Findings

They are anemia, abdominal dropsy and the presence of the parasites in the right heart and pulmonary artery. The worms are easily distinguished by their white appearance and their size. They resemble a coarse white thread, from four to eight inches long, the females being longer, thicker and greatly more numerous than the males. The male is easily recognized by its spiral like tail. There may not be more than one or two worms found, but the number may reach hundreds; usually they are numerous.

Treatment

I have not found an author that offers a system of treatment that promises success. I will here relate the therapeutic measures that I have followed for many years and which I have found quite successful if persisted in and the patient carefully watched. When I am convinced that I have a case of heart worm to deal with, I order a light, easily digested diet of bread and milk, rice and milk and dog biscuits. I then prescribe as follows:

Papain 4 drams.
Cerium oxalate 2 drams.
Glycerin 3 ozs.
Aqua q. s. 6 ozs.
Mix.
Directions: One teaspoonful three times a day to large dogs; reduce dose according to weight.

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I will now describe why the above remedy was made use of. During my early residence in these islands, the problem of heart worm was being discussed between a wealthy Chinese-Hawaiian and myself. He informed me that the old Hawaiian treatment for worms in children was to prick the fruit of the papaya, gather the juice and give it to the youngsters; this he said was considered by Hawaiians to be a specific. As papain is obtained from the juice of the unripe papaya I decided to give it a trial on my heart worm patients, and I have found such virtue in it that its use has been continued for nearly forty years during which time hundreds

of cases have been in my care. My belief is that the papain has no effect on the worms in the heart but that it keeps the circulation free from the embryos. I present this experience for what it is worth and hope it will be tried out by some one who devotes his time to small animal practice and who will note results.

Rabies and Immunization in Dogs

U. E. MARNEY, D. V. M., and CLAUDE CANION, D. V. M., San Antonio, Texas

DURING the past twelve months the disease in dogs known as rabies has been very endemic in and around San Antonio, Texas, and the writers have had some experiences in handling which may be of interest to professional brethren.

To give an idea of the extent of this disease here, will state that from our hospital, laboratory examination has been made on one hundred and ten heads. Other practitioners, of course, have had their quota, and the city health department has doubtless had laboratory examination made on more heads than all the practitioners together. With one exception (this case will be referred to later) all the examined heads from our hospital were positive.

The state laboratory has some visitors from our fair city, taking the treatment, at all times. During one period 120 persons from San Antonio were paying board in Austin. Estimating conservatively, there have been at least 2500 dogs, and some cats, given the single vaccination treatment, a considerable number since we have no ordinance. Other methods for dogs that have been bitten have been used on large numbers of animals. At our hospital the exposed animal treatment has been given to 309 dogs and one cat.

In the handling of exposed, and supposedly exposed, dogs in every day practice, our personal endeavor has been to use the method of treatment that will be possible to use on the largest number of cases and get the results desired. In this respect we have found that an expensive method results in many dogs that are known to be exposed being left untreated or destroyed, and practically all, where the hazard is not positive, going unvaccinated.

We treated practically all of the cases mentioned after the method outlined by Dr. J. C. Flynn; that is, by administering three injections, one every forty-eight hours, of the single injection product.

The observations of veterinarians in this locality on results from the single vaccination method of control, has been very favorable, since there has been no known case that developed rabies after treatment. Doubtless, some of these animals had unknown exposure and it is logical to infer that the treatment immunized some dogs that had been exposed.

In the beginning of the outbreak in our territory it was not uncommon to have an occasional abscess following use of rabies vaccine, and it would appear from reports that this sometimes happens with most veterinarians. For the past eight months all of these abscesses have been eliminated by giving the product intraperitoneally. The technic of this procedure is simple, a 16G. exploring trocar (syringe filling needle) three and one-half inches long, is the instrument used to make thrust puncture into the cavity, in the flank region; the trocar is then withdrawn and the cannula left inserted, air is blown through the cannula, and if there is no resistance it is evidence that the instrument is through the abdominal wall. If the cannula is into the lumen of the bowel, the return air will have the odor of feces.

This method of injection has the following desirable features:

1. Eliminates abscesses as before stated.
2. There is no loss of product and the

most complete and rapid absorption is assured.

3. Has the appearance of a more technical procedure to the public eye.

One bunch of American Fox Hounds, thirty-seven in number, was treated in November of last year, by the above method and technic. A member of this pack had been fighting in the common pen for two days, was brought to hospital with well developed symptoms of rabies and died the following day. Brain examination was positive. Four days after the treatment was finished, these dogs went into the field trials, no animals showing any ill effects from vaccination and no rabies cases have developed to date.

As a matter of policy we never tell the owner that a dog has rabies, on the strength of clinical examination, but that the animal has "symptoms of the disease" and if there is any possibility of persons having been infected by handling of the dog, advice is given that the animal's head be sent to a laboratory; that is, after the disease has run its course, and the dog is dead.

One case that manifested typical symptoms, and in which the laboratory examination was negative, was a dog that was killed after the symptoms were well developed and was not allowed to die of the disease. No animal inoculations were made on this case, but we have known of several cases where dogs were killed and laboratory examination was negative, but the subjects were proved to have rabies on animal inoculation procedure.

Another observation that we have made is that very few of the considerable number of persons that have found it necessary to take preventive treatment have been bitten by their dogs. Practically all of the possible infections have been by the owners allowing dogs to lick their hands, trying to remove an imaginary bone from a dog's throat, force feeding, medication, etc.

Cecal Diverticulum in a Turkey

A. K. GOMEZ, College of Veterinary Science, Los Banos, P. I.

Introduction

SO FAR as the writer has been able to refer to literature on diseases of poultry, not a single case of cecal diverticulum has yet been reported. The object of this paper is to record one such case in a turkey.

Clinical Record

On November 3, 1925, a black female turkey was brought to the clinic of the College of Veterinary Science with the suspicion that the fowl was affected with "limberneck." Upon clinical examination, the following symptoms were observed:

The fowl cannot stand up and if made to do so, it is unable to keep itself steady on its legs (see plate 1); the head is thrown backward and falls over. If the neck is extended and the head is brought forward, the fowl falls on its breast. There is not complete loss of control of the neck muscles as is found in cases of "limberneck." The beak is open, pupils dilated and rapid respiration is present. The crop is empty as the bird refuses to eat and the excreta is fluid and contains a great amount of urates. There is no marked elevation of the body temperature. The digits are flexed and when extended with the hand, they return to this flexed position.

Four blood smears were made from the axillary vein. These were dried, stained with Wright's stain and examined microscopically. This examination revealed marked eosinophilia.

The diagnosis was reserved. The bird was administered five drops of 0.5 per cent sulphuric acid solution in a little water with a medicine dropper. Forced feeding with rice gruel was also given.

The following day, the fowl appeared better, the respiration being easier and the anxious look of the previous day was

no longer noticeable. It was unable to stand up, however, the digits being kept flexed and the body, weak.

Three cc. of 5 per cent phenol solution were injected subcutaneously on the right side. Forced feeding, continued.

On November 5, 1925, the bird was very weak and was found in a peculiar position resting partly on its breast and partly on its right side with the left leg advanced forward and the right one extended backward. The digits were flexed; the peculiar position of the legs could not be altered by manipulation with the hands. The excreta assumed semi-solid consistency and was colored green.

The fowl died on the fourth day after it was brought to the veterinary hospital and a postmortem examination was performed the same day.

Autopsy Findings

External Examination: Rigor mortis is present all over the carcass; the fleshy portion is cyanotic, while the wattles are pale-red in color. The beak is open; there is a yellowish fluid discharge present at the commissures of the mouth. The mucous membrane of the pharynx is cyanotic. The vent is soiled with dried excreta. Weight is 2.1 kilos.

Internal Examination: The subcutis is pale and dry. The crop is partially filled with grass, coagulated milk and a paste-like, slimy, white liquid; its external coat is congested and the mucosa is pale. The blood vessels of the omentum are injected. Serosa of the proventriculus is reddened and its content is slimy, greyish-white fluid. The follicular glands are prominent. The fat around the gizzard is scanty; its muscular wall is atrophied and its content is composed of pebbles, pieces of grass and unhulled rice. The odor of the contents is that of fermented food. The epithelium is adherent and black in color. The mucosa of the small intestines is reddened; that of the duodenum and ileum shows few petechiae. The content is semi-fluid and yellowish and the mesenteric blood vessels are injected. The right cecum presents a large oval diverticulum at its fundus, the size of a hen's egg. This diverticulum is located in the pelvic region to the right of the cloaca and adjacent to the anal opening with its long diameter at right angles with the axis of the body. Its external coat is the same in color as the intestinal wall being covered with serosa. Upon opening this diverticulum, it was found to be connected with the lumen of the right cecum through an opening about 1 centimeter in diameter. A small constriction is present 1 centimeter away from its right pole. The longer diameter measures 8 centimeters, while its shorter diameter is 6 centimeters. When filled with water, it contains about 40 cc. The wall is the same in thickness as that of the cecum and the coats of its parietal wall are continuous with those of the cecum. It is, however, lined inside by a tough, brownish coat of inspissated feces. (See plate 2.) The cavity of the diverticulum is filled with thick, stinking, brownish feces.

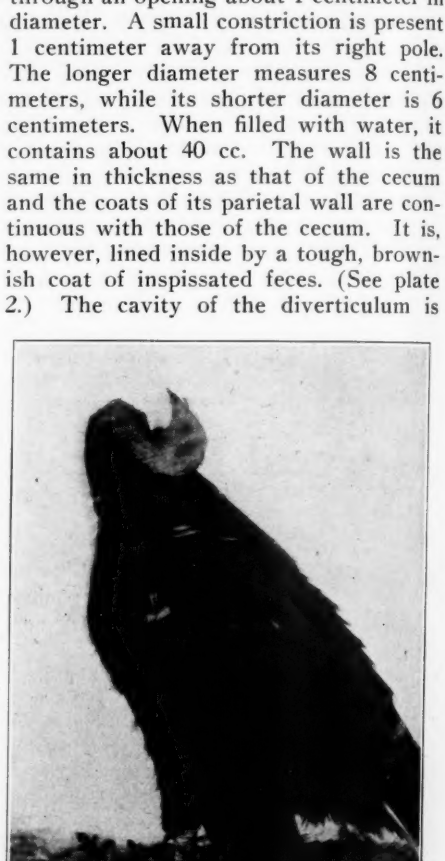

Plate I

The spleen is smaller than normal; it weighs 0.5 gram; is dark-blue in color and the malpighian corpuscles are prominent.

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The kidneys are swollen and reddened. The liver is dark-chocolate-brown in color except at the margin where it is paler and petechiated; it weighs 64 grams; on section, the incision edges bulge out, the cut surfaces are convex, juicy and the central veins are engorged with dark coagulated blood. The gall-bladder contains greenish-yellow bile. The ovaries are reddened; presence of immature ova ranging in size from a sago grain to that of a pea and the blood vessels of the oviduct are injected.

The pleural cavity is glistening and moist; there is an extensive adhesion between the left thoracic wall and the left lung. The heart is cone-shaped; there is present at the apex, a small area of necrosis the size of a pinhead; the coronary blood vessels are prominent and surrounded by yellow fat; the auricles are distended with dark coagula; the ventricles contain little blood. The heart muscle has a cooked appearance. The left lung is closely adherent to the thoracic wall by fibrinous exudate; one-half of its area is hepatized, gray in color and pieces of it placed in water do not float. There are two areas of necrosis the size of a grain of corn present in this lobe. The right lung is pink-red in color and is crepitant. The trachea and bronchi are congested.

The bone-marrow of the femur is pale-red. The blood vessels at the base of the brain are engorged with blood.

Anatomico-Pathological Diagnosis

1. Atrophy of the gizzard.
2. Hemorrhagic enteritis (mild).
3. Cecal diverticulum, acquired.
4. Cloudy swelling of the solid organs.
5. Fibrinous pleuritis.
6. Fibrino-purulent pneumonia.
7. Coprostasis.
8. Auto-intoxication.

Epicrisis

1. Primary cause of death is auto-intoxication resulting from coprostasis due to a diverticulum of the right cecum.

2. Secondary cause of death is purulent pneumonia.

The diverticulum was probably caused by the adhesion of the fundus of the cecum to the ischium as a result of local peritonitis. This adhesion must have given rise to retention of fecal material and gas formation in the right cecum with consequent weakening and permanent distension of the distal portion of this organ resulting in the formation of the acquired diverticulum.

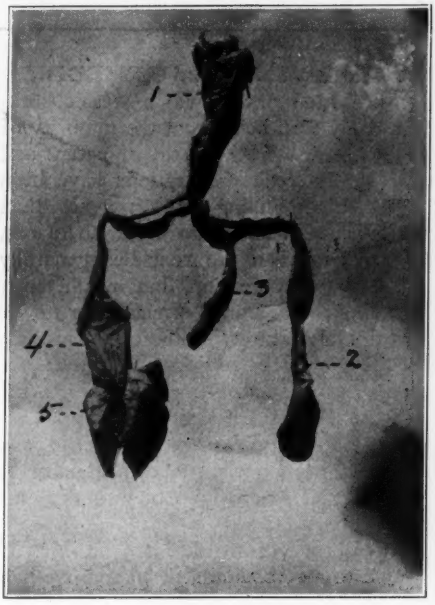

Plate II
1—cloaca; 2—left cecum; 3—ileum; 4—right cecum; 5—diverticulum.

Swine usually thrive on alfalfa pasture; however, an occasional field of alfalfa seems to be of little value for feed as swine do not thrive unless provided with other feed or changed on to other alfalfa. Cattle can not be pastured on some alfalfa fields because of uncontrollable bloat; however, other fields can be pastured without danger of bloat. Is this variation in alfalfa as swine food and in the occurrence of bloat in cattle due to a variation in the chemical composition of the plant? It has been observed that the alfalfa plant forms no tubercles excepting in inoculated soil.

CASE REPORTS

WORMS VS. WORM REMEDIES

I have on several previous occasions expressed my firm belief that the majority of worm remedies in the form of patent and other highly toxic preparations have been the means of killing more puppies than ever worms killed. I do not wish to cast any reflections on the remedies generally used by the profession, but would urge upon the small animal practitioner to be careful and think twice before using too freely some of the preparations now advocated in canine and feline practice. Especially do I consider this necessary in the case of puppies under six months old, and in this connection wish to call attention to a case that recently came under my observation.

On February 14th of this year, Mr. M. brought to my hospital a three and one-half months old male German Police puppy with the history that it had not taken anything in the way of food for over twenty-four hours, had been having fits and vomiting, would eat rocks, pieces of cement and other foreign bodies, and the humane officer had been sent for to destroy the animal as the owner believed the dog had rabies. The humane officer advised him to take the puppy to a veterinarian for treatment.

I was informed that two or three days before a local veterinarian had pronounced the case hookworms and given the puppy some capsules filled with worm medicine, which later proved to be oil of chenopodium. Three of these capsules had been given before the animal began to have fits. I am not sure how many drops of oil of chenopodium were in each capsule, but am quite sure there was too much for a puppy so young.

Mr. M. informed me he had paid $100 for this puppy when it was six weeks old, and he wanted me to do everything I could to save the animal. I remarked that I could not hold out much hope, but would do my best. This was at 10 a. m. and I gave the puppy 1/10th grain lobelin sulphate hypodermically in an attempt to produce emesis, but without results. In fifteen minutes I gave another 1/10th grain, and in less than three minutes after the second dose, the puppy vomited something like a double handful of food, mucus, worms, some rocks and the top of a Cocoa-Cola bottle. After this he went to sleep and was not disturbed for over an hour. About 11:30 I gave a worm tablet that I have been using for quite a good many years with good success and with comparatively no harm to the patient. This worm tablet carries a laxative with it. In this connection I want to warn the practitioner against giving a worm medicine that has to be followed by a cathartic, as a great many times the toxic substance will stay in the stomach and intestinal tract too long before the cathartic is given and be absorbed into the system, doing much harm to the patient and even causing death.

At 6 p. m. the worm tablet produced a good action, bringing several roundworms, also a great number of Dipylidium caninum. The patient was left for the night with a pan of water placed where he could get to it. I came to the hospital at 5 a. m. on the 15th to see if the puppy had died during the night, which I was pretty sure would be the case, but to my surprise he was still living and up and walking around. He was put in a large stall where he could have some exercise. He had had another action of the bowels during the night, but no worms had been voided. The kidneys acted freely, and the animal was very thirsty, but would not even look at any food. He showed affection of the brain with what the layman calls "blind staggers."

He could scarcely see at all and ran into any object that was in his way. I saw he had to have a change of treatment and also some nourishment.

I began at 6 a. m. giving ten drops of echinacea (Lloyd) every hour in a tablespoonful of sweet milk. This was kept up until 1 p. m., when he had become so paralyzed that he could not stand any more. I thought the end was near as I could not detect any pulse nor respiration. I decided to make my last stand and try a respiratory stimulant. The patient could no longer swallow, and of course hypodermoclysis was the only means of getting anything into him. At 1 p. m. I gave 1/20th grain lobelin sulphate, again the same amount at 2, 3 and 6 p. m., making four 1/20th grain doses of lobelin sulphate that afternoon. Shortly after the first dose had been given, the owner came to see how his puppy was getting along. I informed him that in my opinion it would be only a question of a few hours until the patient would be dead. I was asked my charges and named them with 50 cents added to pay the scavenger for taking the body away. This was paid and the owner started to get into his car, when I asked him to leave his telephone number as I had just a few minutes before given the animal a stimulant and he might yet revive, and I wanted to know where to get in communication with the owner in case the puppy died.

Before time to give the second dose of lobelin sulphate, I laid the puppy out on the concrete floor at the back of the hospital and went about my other work. In a few minutes I looked toward the rear end of the hospital and saw the puppy up walking around. I hastened to him, picked him up and put him in a cage and gave the other three doses of lobelin sulphate as previously mentioned. At 5 a. m. on the 17th he had about recovered from his mental delusions and I gave him some boiled meat finely cut up. He acted as if he was starved, and I fed him four or five times during the day. I telephoned Mr. M. that we had a very live corpse and to come and see him. He arrived in a very short time and took the puppy home seemingly as good as he ever was. I was paid the balance of the account with a deduction of 50 cents undertaker's fee that had been tendered before. Just another triumph for lobelin sulphate, echinacea and the non-toxic worm tablet.

The worm medicine I used in this case is composed of the following formula, each tablet containing—

Aloin	1/8 gr.
Podophyllin	1/20 gr.
Ext. leptandra	1/8 gr.
Ext. balmony	1 gr.
Jalapin	1/50 gr.
Resin scammony	1/50 gr.
Oil Mentha piperita	1/20 gr.

Sig: One tablet each morning before breakfast until three or four tablets are given.

I used to have the local druggist make up this formula for me in the form of pills, not coated, and while they did the work, they constituted rather a bitter dose and were far from looking nice. I have now made arrangements with the Drug Products Company of New York City to put them up for me in the form of pulvoids, listed as special formula No. 3176. They make about a two-grain tablet, sugar-coated, pink, and of course the drugs used are of the best quality. I do not claim that these tablets will get all the worms, round and tape, although I have had little occasion to use any other worm medicine.

If I am in doubt that there are tapeworms this preparation will not affect, the remedy that never has failed me yet is granatum (pomegranate). However, I almost always use the active principle, pelletierin hydrochlorid, 5 to 10 grains, and then I use the two together, say at 6 a. m. give 5 to 10 grains pelletierin hydrochlorid, according to the size of the dog, and in an hour give one of the above mentioned worm tablets, repeating the tablets every morning for three more mornings. This treatment may be repeated in fourteen days if thought necessary.

G. W. Browning, V. S.

Mobile, Ala.

BREEDING DISABILITY IN A BOAR

I have a client who has a very highly bred Hampshire boar that is now nearly a year old, and he desires very much to use him for breeding purposes, but the boar does not seem to be able to protrude the penis either to urinate or copulate. This is the second case of a similar nature on this ranch, the first animal so affected having been sold to the butcher. I desire to operate on this second case to see if something can be done to relieve the situation. Any information that can be given will be acted on and the results reported in Veterinary Medicine.—A. S. L.

Reply by A. T. Kinsley: It is presumed that the boar in question has some sort of adhesion that is responsible for the condition described. Some times there is found a fibrinous adhesion that may be broken down without much difficulty and the condition relieved so that the animal becomes a certain breeder. Further than this, we are unable to give any definite recommendation in this case.

NERVOUS AFFECTION IN A MARE

A client has a Shire mare, seven years old, weight 1600 pounds, in good flesh. When hitched to an empty wagon, she goes into a fit, sweats, breathes as if choking, eyes red. The owner said the animal also bled from the nostrils, fell down on the road and lay as if dead. This is the third time this has happened. The collar fits well, and anyhow she does not even start to pull. She trembles all over. She will run and play with other horses, also has been trotted for ten miles led beside a saddle horse without showing any ill effects. Is it a nervous affection causing a derangement in blood circulation? I have advised the owner as to the feed but do not think the condition is due to digestive disturbance.—T. G. K.

Reply by J. F. DeVine: After describing the symptoms the mare displays, you ask, "Is it a nervous affection causing derangement of the blood circulation?" I think you have answered your own question as well as any one could answer it. I have been somewhat of a "horse jockey" from the time I was able to hold the reins and have practiced veterinary medicine around thirty years in a distinctly "horsey" atmosphere, and I know of no specific ailment analogous to the one you describe, so like yourself, I must guess. It certainly seems as if this mare suffers with a congestion of the brain and that she has at some time experienced an accident that occasions excitement when she is hitched up. It seems very probable that there must be either an abnormal cardiac or cerebral condition associated with her fear or excitement.

SCOURS IN YOUNG PIGS

I have a client who is really a good hog man, one who lives up to the McLean County system of sanitation as nearly as is possible, endeavors to keep up to date concerning the care and feeding of hogs, and usually has the record for placing as many good, healthy, fat hogs on the market, considering the number farrowed, as any one in the community. However, there is some trouble on this farm every spring and fall in the nature of pig scours. This condition usually affects the pigs at about three or four weeks of age, just about the time they begin to crack corn and partake of the sow's ration, which consists of ground oats, corn, pig meal, and some mineral or patent hog food or medicine. The scours are yellow and have the characteristic odor of pig scours. The pigs become unthrifty, with rough coat, etc. There are practically no deaths, but the condition stunts the little fellows, and it takes some time to bring them back to a thrifty bunch of pigs. I feel that feeding conditions may be at fault, but just how I cannot determine as these animals usually come along fine until they begin to eat food other than the mother's milk. Could it be the change from mother's milk to other feed? If so, just how should they be started out?—J. H. K.

Reply by A. T. Kinsley: The condition described occurs in pigs about one month of age and as you state at the time they are fed food other than the mother's milk.

From your description it seems probable that the condition is of dietary origin. However, it appears rather unusual that the same condition prevails every spring and fall. This fact would lead one to believe that some infection is responsible. The usual infection involved in this condition is the B. suipestifer or some closely related organism, and, of course, this would reflect on the sanitary conditions, or indicate the presence of infection on the farm due to some previous cases of necrotic enteritis.

It has been demonstrated that a positive immunity can be produced against the B. suipestifer by a bacterin made of cultures of that organism. Before jumping to the conclusion that the condition is due to suipestifer, it is suggested that a careful laboratory test be made of one of the affected pigs to ascertain whether or not the B. suipestifer is a factor.

As to feeding, it is suggested that soaked ground oats or barley be substituted for corn in the beginning and if possible some milk, either semi-solid buttermilk or skim milk, or whatever is available, be used in conjunction therewith.

ATROPHY OF UDDER FOLLOWING MAMMITIS

A valuable purebred Jersey cow, five years old, freshened two months ago. After calving she had a slight attack of mammitis in the left hind quarter of the udder. When the inflammation had subsided, the milk flow in this quarter gradually decreased until at present the cow is giving only half the normal flow. This quarter is pliable but is atrophying. Any suggestions that will help out in this case will be appreciated.—M. H. T.

Reply by J. F. DeVine: Have the quarter milked three times a day and thoroughly massaged after each milking with equal parts of olive oil and grain alcohol. Keep this up during the lactation period, and when the animal is allowed to go dry, stop. Begin again to massage but not milk about three weeks before the cow is due to freshen. Confine your efforts to this one quarter during this time. We frequently can stimulate the return of a normal sized gland by this method.

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Dr. J. W. Caldwell of Hemet, Cal., who sent in this picture of a two-headed calf on February 27th, states the animal was then 18 days old, alive and healthy. The mother is a grade Jersey-Guernsey cross and the sire a purebred Jersey. It was the cow's second calf, the first one being normal in all respects. The mother has a deformed tail, it being about one-half the normal length. The calf can nurse with either mouth or with both at the same time. The animal is normal with the exception of the head, which has two normal ears, four (2 normal) eyes, two being set in the frontal bone and blind, four nostrils, two mouths, lower jaws both curved. The woman in the photo is Mrs. W. P. Blodgett, wife of the owner of the calf, who is one of the largest and most prosperous dairymen in that vicinity.

Stovarsol is one of the newer arsenicals which has recently been introduced from France. It is now being manufactured in America under the name of Acetarsone.

DIETARY DEFICIENCY CAUSES LOSS OF PIGS

Some information is desired relative to a fatal condition in pigs that exists on at least one farm in this community. These pigs are in a new well lighted and ventilated hog house. The floor is of cement but ample bedding is used and the pens are cleaned daily. The sows are placed in the hog house about one week before farrowing and none of the pigs have been out of the hog house. The general care of the sows and pigs could not be improved upon. The owner has about 120 more sows to farrow and is anxious to reduce the losses to a minimum.

Three or four pigs died daily when the condition was first investigated. The losses occur in pigs about two weeks of age. These pigs appeared to have a desire for something they were not getting for they would lick and gnaw at one's shoes. The first symptoms evidenced are depraved appetite and tucked flank. The affected pigs continue to eat until death which occurs about 48 hours after the onset. There is no thumping or any other symptoms indicating pulmonary or digestive disorders.

The lesion observed on postmortem was anemia evidenced by a small amount of thin, water-like, non-coagulable blood. The muscles are quite pale, probably because of the anemia. There was no evidence of pulmonary ascaridosis or other pulmonary disorders.

A tentative diagnosis of dietary deficiency was made and a combination of minerals, containing calcium, phosphorus, salt and potassium iodid and codliver oil was prescribed. The losses have been reduced from 3 or 4 each day to one a day.

Any information relative to the above condition will be appreciated.—M. A. L.

Reply by A. T. Kinsley: Your inquiry relative to the loss of suckling pigs has been read with a great deal of interest. You should be complimented on the complete report in which you have given the details of the history, symptoms and lesions, the three essential factors upon which a correct diagnosis depends.

It is the opinion of the writer that your diagnosis of dietary deficiency is correct and the treatment prescribed is apparently effective. One further safeguard against ascaridosis is the thorough scrubbing of the sows before placing in the farrowing pens.

CANINE DISTEMPER

The case about to be described was that of a registered Setter bitch, a puppy, field trial winner. The animal came down with distemper while at the trainer's home and was sick for about two weeks. The trainer wired the owner the condition of the dog, and the owner wired back for him to ship the animal to me at once, by express, the distance being about eighty miles.

The dog arrived on the evening of July 8th. I met the train and found the animal practically exhausted and unable to raise her head. The patient was rushed to the hospital and found extremely weak with irregular pulse, fetid breath, anemic condition of the mucous membranes, fetid diarrhea, and disinclination to move.

The dog was immediately given about a third of a pint of whole milk with two eggs beaten up with a tablespoon of lemon peel—alcoholic (this state is bone dry). This was given by spoon. Hypodermically I gave 20 cc. anti-distemper serum. In two hours the patient rallied slightly. The milk and eggs with lemon peel were repeated in about four hours, and then I began to give the following preparation every three hours, following with nourishment: acetophenetidin, 1 grain; magnesium salicylate, ½ grain; phenol salicylate, 1 grain; quinin sulphate ½ grain; aloin, ⅛ grain; caffein alkaloid, ⅛ grain (Pitman-Moore Co.).

This treatment was kept up for three days with the lemon peel omitted after the first night. Castor oil was given beginning the third day, two tablespoons once a day, this being a great intestinal antiseptic and bowel regulator for canine patients. Within five days, the patient showed enough improvement to raise her head and by support sat up and took nourishment. The mouth was

swabbed three time a day with a proprietary antiseptic composed of boracic acid, alum, berberin, carbolic acid, menthol, thymol and eucalyptol.

At the end of the seventh day, the dog was taking some solid nourishment such as raw hamburger but mostly eggs and milk. The heart was beating regularly, but the bowel movements continued bad with a fetid odor. Feeding was continued at this time every three hours, and at each feeding period medicine was given but never in the food. The patient's kennel was cleaned as many times a day as was needed to keep it clean. It was scrubbed with antiseptic each morning and the dog changed to another kennel until the cleaned one was dry. Always fresh bedding was used.

By the end of the ninth day, the dog was able to sit up but showed paralysis of both hind limbs. At this time I began the use of the preparation known as Aricyl (an arsenical preparation) and in this particular case obtained excellent results with it, but in other cases where I have used it, I got no better results than with Abbott's triple arsenates.

The treatment as outlined in the beginning was continued until the fifteenth day. The animal's appetite was good, the condition of the bowels was fair at times and bad at times, but the general condition was good, with the exception of a total paralysis of both hind limbs. At this time the dog was given direct sunlight exposure, at first ten minutes, which was gradually increased to one hour twice a day, with massage of the spine thirty minutes twice a day.

At the end of the third week, the dog could stand up and take irregular steps. Here I began the use of a second box of Aricyl, with improvement in the paralysis of the limbs, but the animal was weak. Then the medicine was changed from the acetophenetidin preparation of Pitman-Moore to Abbott's sulphocarbolates, with cod liver oil, 15 minims, in the feed once a day over a period of ten days, when the treatment was changed to elixir of iron, quinin and strychnin tonic, with milk and raw hamburger diet and direct sunlight exposure. By the fourth week the animal's paralysis had left, but symptoms of chorea had developed in the left front leg. This was caused by the patient's effort to raise and support herself while the paralysis existed in the hind limbs.

The dog remained in the hospital for two and one-half months, being a valuable animal, and the owner wanted her strong before turning her out.

In concluding this report, I wish to say that the dog made a fine recovery, except for a slight jerking of the left forelimb, but on exercising she warmed out of this. I might mention that I never recommend any exercise, except walking, for at least two and a half to four months after the termination of a severe case of distemper. I have my doubts about this animal ever becoming a field trial winner again, as I have treated two other cases with chorea like this that practically got over it, but on being given the strenuous and exhausting exercise they get in the field trials, both broke down physically.

Thus, ends a case where with good nursing and careful medication along with some osteopathic treatment, a practically dead animal was saved. But let me add that this treatment is no specific, although I have had good success with it, especially in cases of the intestinal type. Yet, the outcome of other cases has been so bad that at times I have felt like giving up small animal practic. When one writes of canine distemper, he should write a book, as each case that terminates successfully is a book of experience, and it is practically impossible to deal with it fully in a case report unless one reports it in detail over a period of months, as every case gives a varied number of symptoms and complications.

John W. Brown, D. V. M.
Ft. Scott, Kans.

A delicate electric needle has been devised by Kelly of John Hopkins University to be used in place of the surgeon's knife. It is claimed that this electric needle renders operations less painful and dangerous.

MILK REMEDY FOR COCCIDIOSIS

Doctors Beach and Davis, in Hilgardia, October, 1925, page 167, a technical bulletin of the University of California Experiment Station, reports that the organism which causes the death of chicks from coccidiosis is controlled in the intestinal tract of the chick by the converting of a considerable amount of milk sugar (lactose) into acid ("increased hydrogen ion concentration," the scientist expresses it) in that part of the intestine where it normally makes its home and does its damage to the health of the young chicks. An increased resistance and better health of the chick, due to the nutritive value of the skim milk, is doubtless a factor in overcoming the coccidiosis.

It appears from the report of these experiments that chicks won't eat enough milk sugar (lactose) as such to be effective, but a dry mash made up of 60 per cent of the usual ground grains and 40 per cent of dry skim milk, which is ordinarily about 50 per cent milk sugar (lactose), is freely eaten and produces the desired intestinal condition. Some California poultrymen are using what they call Beach's mixture, made up of 40 per cent dry skim milk, 10 per cent shorts or bran, 30 per cent yellow corn and 20 per cent barley, all finely ground. This dry mash should constitute two or three parts to one of grain for the day's ration for the young chicks. Water should be accessible and green feed fed as usual. A very considerable labor saving is made because Doctors Beach and Davis say that the dry mash must be fed in a hopper constantly accessible to the chicks, otherwise they will not consume enough to secure the necessary milk sugar to control the disease.

A reduction in mortality at 32 days of age from 23.8 per cent to 2.3 per cent is reported in the bulletin. The chicks fed dry milk averaged 185.5 gm. at 32 days of age as compared with the weight of 146.9 gm. at the same age in the control lots which did not have the dry skim milk. Poultrymen of the Pacific Coast unfamiliar with these experiments are already using appreciable amounts of dry skim milk in their mash mixtures for growing chicks, pullets and laying hens. The quantity is varied according to local cost and the poultrymen's appreciation of its effects on their flocks. It is estimated that fully eight million pounds of dry skim milk have been fed Pacific Coast flocks this last year.

Almost complete elimination of coccidiosis substantially lowers "mortality losses." "More rapid growth"—"fewer culls"—"less sick birds"—"less labor in feeding" are results enumerated for these discoveries of Doctors Beach and Davis by commercial poultrymen who have tried the recommendations in practice.

"The lower mortality loss offsets any increase in cost of feeding dry skim milk," is the comment of poultry raisers who checked up in their large commercial flocks the experimental conclusions worked out in the laboratory by Doctors Beach and Davis. Both the experimenters and the poultrymen observed a more rapid development which made possible earlier segregation of pullets and cockerels as a result of the feeding practice recommended by the scientists.—Animal Pathology Exchange, Univ. of Ill.

AFFECTION IN CATTLE PROBABLY OF DIETARY ORIGIN

Some interesting cases in cows were recently observed. These cases occurred on different farms, but all of them manifested similar symptoms, as follows: Swollen vulva, anus, teats and eyelids, serous discharge from eyes, salivation, labored breathing and some evidence of perspiration. These cases were all given a saline purgative and small doses of nux vomica and were relieved in from twelve to thirty-six hours. Any information relative to the cause of this malady will be appreciated.—H. M. C.

Reply by A. T. Kinsley: From the description, it seems probable that the cases in question were of dietary origin. No mention is made of the character of the feed provided for the cows, and it would be of interest to have that information.

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There are certain disturbances of the skin and mucosa other than urticaria that occur, particularly on skin areas that are not intensely pigmented or white, such as the teats, muzzle, etc. These cutaneous disturbances are apparently caused by ingredients of certain plants such as buckwheat, clover, alfalfa, St. John's wort, potatoes, and also by brewers' malt, whisky mash, etc.

It is probable that the cases described may be traceable to some of the materials mentioned and probably to clover. A description of skin irritation due to clover may be found in Hutyra and Marek's "Pathology and Therapeutics of the Diseases of Domestic Animals" under the caption of trifoliosis.

INFECTIOUS KERATITIS OF SHEEP

Information relative to a small band of sheep in which there is a very severe disorder of the eyes is desired. This condition is occurring in a band of sheep that are properly sheltered and cared for. Age is not a factor in the susceptibility and both pregnant and non-pregnant ewes become affected. The disease is manifested by an inflammation and opacity of the cornea, ocular and nasal discharge, inappetence, loss of weight, and pregnant ewes abort. The disease runs its course in about two weeks and usually without permanent injury. This condition is apparently similar if not identical to infectious keratitis in cattle. Any information relative to cause and treatment will be appreciated.—H. P. B.

Reply by A. T. Kinsley: Infectious keratitis in sheep is not very common, or at least veterinary literature does not contain many case reports. Your description is in accord with Baker's description of infectious keratitis.

The treatment for this condition in sheep is the same as the treatment for cattle affected with the same malady. In severe cases the irritation may be relieved by the use of cocain or quinin and urea hydrochlorid. Solutions of protargol or argyrol are of value in clearing up the cornea. Bacterins containing the various pyogenic bacteria and the B. bipolaris have been used successfully.

LOSSES OF SWINE FED WHISKY MASH

A feeder near Kansas City conceived the idea that dry bread and shorts soaked in whisky mash would be an economic feed for swine. The whisky mash was made by using about 100 pounds of unrefined sugar and 2 gallons of cracked corn to 50 gallons of water. This mash was kept in open barrels and permitted to ferment for several days. The mash fluid was used in soaking dry bread and shorts. The amount of the mash fluid used was gradually increased and in about ten days each shote was receiving about one-half gallon daily. After feeding the whisky mash combination for about twenty days some losses occurred. An investigation revealed the fact that a large percentage of the swine became intoxicated after consuming the whisky mash feed. This condition was manifested by disturbance of locomotion, incoordination and peculiar antics and activities indicating cerebral stimulation. This intoxicated condition would be evident for from 15 minutes to an hour and the affected individuals would assume and continue in the decubital position until the next feeding period.

This lot of swine, some 200 in all, were of various breeds and weighed from 125 to 175 pounds and appeared thrifty although from one to three or four died every 24 hours. The shotes that died did not evidence any symptoms except intoxication. Autopsy revealed no lesions and the deaths were correctly or incorrectly attributed to the diet and a change of feed recommended.

Were the losses due to over-stimulation resulting in apoplexy or some other brain disorder? Is fusel oil, in limited quantities, poisonous to swine? Will the production of whisky mash as above described produce sufficient fusel oil to be injurious?

A full discussion in Veterinary Medicine of the above and particularly of the questions regarding intoxication and fusel oil will be appreciated. A. T. K.

HOG CHOLERA LOSSES IN 1925

A recent official report estimates that the loss from hog cholera for the entire United States in 1925 was approximately 30 hogs per thousand. Maryland's loss was only one-third of that or 20 hogs per thousand less than the average. This means a saving of at least 5060 hogs. On January 1, 1925, the average value of hogs in Maryland was $12.90 per head. This shows a saving to the Maryland farmers in dollars and cents of $65,274.00 under the average loss in the United States. In this connection, it should be noted that Maryland has far more than the average number of hogs per square mile, as compared with the swine population in the various states.

The official report referred to in the previous paragraph states that the low loss over the United States for the year was apparently evidence of the effectiveness of the previous use of the preventive serum treatment. This cannot apply in Maryland, for the records for the past eight years show that less than one-third of 1 per cent of the hogs in the state have been immunized with the simultaneous treatment.—From Annual Report of Dr. I. K. Atherton, U. S. B. A. I. Inspector in Charge of Hog Cholera Work, College Park, Md.

The accomplishments of chemists in synthesizing complex organic compounds is of great scientific and economic importance. Rose and Cox have demonstrated that a synthetic product devoid of an amino group can be substituted for histidin, a protein building material that had previously been considered essential for the growth and development of man and animals. If the histidin substitute prepared by Rose and Cox can be produced economically in sufficient quantities, it will simplify the feeding problem.

REVIEWS OF FOREIGN LITERATURE

Claiming that persistent bloody diarrhea found in dogs and cats in many cases is due to coccidiosis infection producing the enteritis, Professor M. A. Martin, writing in Revue Veterinaire, September, 1925, issue, caims it is due to Isospora bigemina, rivoltoe and cati. The only method of positively determining the infection is by microscopic examination of the feces. Where one has a persistent diarrhea to treat in either the dog or cat, in some cases having a partial recovery to again have the condition return, it would be well to take this disease into consideration. His prognosis is grave and in treatment he cites many different drugs but claims that in his experience the results have been very poor. In this article he mentions the fact that in this same condition in man, amebic dysentery, they use emetin in the treatment giving it by intravenous injection. In acute cases in the human, the treatment is the same as for colitis, a diet of milk, lime water, beef juice, white of eggs, milk toast and custard, mild counter-irritants as mustard plaster, administration of saline purge or castor oil to clear the bowels, followed with some sedative as opium by the mouth or morphin hypodermically, bismuth subcarbonate in large doses; when the rectum is irritable ice suppositories or a solution of warm mucilage of starch. It is now generally believed that emetin is a true specific destroying the amebae in the tissues and comparable to the action of quinin in malaria. Hypodermic administration subcutaneously is used giving one-half grain emetin hydrochlorid twice a day, or one grain once a day for ten days or two weeks. And there is less likely chance of a relapse if ipecacuanha, 30 to 50 grains, in salol coated pills is given daily for several days after the discontinuance of the emetin. It is best to give at night before retiring and precede it by giving 15 drops of laudanum half an hour before so that there will be small chance of vomiting. Irrigation of the bowels daily, and if the rectum is irritable Butyn can be added to the solution. This covers the treatment that can also be applied to dogs as well as cats.

In the same issue P. Vauthrin describes several cases of enzootic icterus in the dog claiming that in all the cases noted they have had a mortality of 95 per cent. In his description of this disease he relates two types, the hemorrhagic or acute type with complete prostration and acute nausea with hemorrhage from the intestines, and the icteric type, not as rapid with noticeable jaundice and in the majority of the cases an invagination of the intestines, in some cases prolapse of the rectum. In their researches they found different types of spirochæta and rats as the carrier. In their treatment they give anti-leptospire serum and clean out the intestinal tract. From the clear description written by Vauthrin we have come to the conclusion that the disease described is the same as hemolytic icterus, ably described by H. Z. Giffin of the Mayo Clinic in their book of 1917, in which they advocate removal of the spleen, the method recommended by us for trial in these cases in our article on splenectomy in a recent issue of Veterinary Medicine.

Hemorrhagic gastro-enteritis in the dog is well described by G. Antoine and F. Liegeosis in Annales de Medicine Veterinaire. In this article they describe the condition we have to contend with, here commonly called sore mouth, dog typhus, Stuttgart disease, etc. The writers claim this is mostly a toxic condition and name four types of spirochaeta and two bacilli as being the causative factor creating a reno-digestive disorder with resultant toxemia. In their treatment they recommend numerous drugs used according to the condition of each individual case. The writers were handicapped by the number of cases they were permitted to hold autopsies on and will no doubt at some later date give a further article on their work; however, they have carried it further than any other investigators on this disease, in our opinion, and are to be congratulated on their excellent presentation of the subject.

J. G. Horning and A. J. McKee
Houston, Tex.

RELATION OF SUNLIGHT AND GREEN FEED TO LEG WEAKNESS IN CHICKS

Chicks reared in the open rarely have leg weakness. This is usually attributed to green feed and soil, while little or no thought is given to the effect of sunlight. Experimental studies have revealed the fact that direct sunlight is a better preventive of leg weakness than green plant tissue or soil. In this work ten experimental groups of 25 White Leghorn baby chicks each were housed and fed a basal ration of white corn (2) and standard wheat middlings (1) 80; casein 16; and salt mixture (bone ash 3, calcium carbonate 1, and salt 1) 4. Various amounts of green (fresh) second-growth red clover were fed to the lots on this standard ration, a part of the lots without and a part with exposure to direct sunlight for one-half hour or one hour daily (except Sunday). Four other groups on the standard ration, with and without green feed, were housed in an outdoor shed with access to an elevated floored and screened runway.

In general all chicks kept indoors, even those receiving green clover up to 18 per cent of the ration, calculated on the basis of the dry weight of clover, developed leg weakness between the sixth and eighth weeks. The groups receiving the same ration, including green clover, but in addition the short daily exposure to direct sunlight did not exhibit signs of leg weakness and made approximately twice as much growth as the chicks unexposed to sunlight.

The chicks permitted out of doors all made normal rate of growth without signs of leg weakness. Green feed and soil appeared to exert a slight improvement in nutrition, but in general not as great as direct sunlight. It was possible to raise chicks at a normal rate of growth on the basal ration when they were permitted on the runway exposed to sunlight but without access to green feed or soil. The same ration leads to leg weakness and nutritional failure between the fourth and sixth weeks when the chicks are confined indoors.—Annual Report Ohio Exp. Sta.

"RUNNING FITS" IN DOGS

Dog owners around here have had lots of trouble with "running fits" in dogs for the last two years. I have been very successful in controlling this condition by the administration of carbon tetrachlorid in most cases. However, I have two cases at present in which I am at a loss to know what the cause of these fits can be. One is a pointer bitch, about two years old. The other is a setter dog, about the same age. They are owned by different clients. Both dogs are fed table scraps and a liberal amount of meat once daily. The dogs are in good condition and seemed to be all right until the bird season opened up last fall and they began hunting. Then they began to have fits, sometimes a half dozen a day. Since then the dogs have had every kind of worm treatment imaginable, and the yards have been cleaned following treatment, but the animals still continue to have these fits when exercised very much. The setter dog has had several fits in the yard lately without any exercise or excitement. The fits last only for a few minutes. The dogs will run and bark or howl. After the fits pass, they will hunt as good as any dog until another fit hits them. Neither dog has ever had distemper or been sick in any way before. I should appreciate diagnosis and treatment for these dogs as both are high-bred registered bird dogs.—C. H. D.

Reply by J. G. Horning: We have quite a bit of this trouble here all the time, and so do the other veterinarians throughout the state. After giving the matter careful thought, we have finally come to the conclusion that the so-called "running fits," "fright disease," etc., etc., is really a symptom or group of symptoms that should be termed "reflex meningitis." We find this present with the various types of worm infestations, Dr. McKee and the writer having made a report on hookworms as the causative factor in "fright disease" (Veterinary Medicine, December, 1924). However, we also find the condition present with other worm infestations. It has been noted in cases commonly termed distemper where there is a colon bacillus infection of the intestines, but only in those cases where the colon bacillus is present. The affection has also been noted in dietary conditions where the dogs were fed too much starchy foods and the percentage of meat was very small or absent. Likewise, it has appeared in several cases where there was a renal retention, and in several cases of acute pyelitis, the colon bacillus being found in all cases.

The usual treatment is given for both hook and tape worms. For the colon bacillus infection of the intestines we use Abbott's intestinal antiseptic five-grain tablets, and urotropin tablets, 7½ grains, for the kidney infection. The dosage varies according to the case, but it usually is given three times a day. In the dietary condition, we advise that the animals be placed on at least a 50 per cent meat diet twice a day.

Another thing, the owner's statements are never accepted as facts until verified by us, as in many cases clients unintentionally mislead the practitioner by stating that this or that has been attended to when such is not the case. For this reason, whenever possible every case is treated in the hospital.

The exact function of the parathyroid glands is still a moot question. There is, according to Ivy of the Northwestern University a relationship between the parathyroid glands and the large colon. Parathyroidectomy is a possibility when done in conjunction with colectomy, according to Ivy.

Pig production in the south central states has decreased continuously for the past five years and is now at the lowest point of production for fifteen years. There is a splendid opportunity for profitable swine production in the south central states and the veterinarian can be of service in stimulating swine production.

EVERTED RECTUM IN A MULE

I am engaged in the shipping of horses and mules from the National Stock Yards, Ill., and I sell the animals to farmers in the surrounding country. I had just received a shipment of mules, which were unloaded and removed to my pens for filling up, when one of the onlookers remarked that one of the mules "had his guts coming out."

The subject was a five-year-old horse mule, weighing about 1000 pounds. His rectum was protruding about six inches and he was straining rather severely. This mule was caught and placed between gates which are used for catching mules, a nose twitch applied and the protruding rectum replaced. The animal was watched for a while, and no relapse being noted, he was turned into the pens, when he immediately commenced to eat. I thought to myself that he was all right and that the prolapse was merely a passing condition incident to shipping. However, it was not so.

In about an hour, the mule strained and out came the rectum again. Again it was replaced, and I took a walk to town for a cigar and observation. When I returned the rectum of the mule was again protruded. I thought of the splendid article in the January number of Veterinary Medicine, written by my good friend, Dr. Browning, down at the southern end of the M. & O. Railway, and his bright shining rectal ring that he was ten days getting from Memphis, and thought I would call him over the telephone to send it to me. However, night was coming on and train service down in this neck of the woods is not what it is up north.

I replaced the rectum, trusted to luck, walked around the block, came back, and there it was out a little farther and a little more congested. What could I possibly do to retain the "blooming thing." A half grain atropin sulphate together with one-half grain lobelin sulphate hypodermically assisted materially in checking the straining. Four ounces of paregoric were also given orally.

I could see the profits on half a dozen mule sales gone if this mule continued his foolishness. There the thing was out again. Another hypodermic shot of one-half grain each atropin sulphate and lobelin sulphate. Another replacement. It was now midnight. The proposition was getting old and no progress was being made.

At last an intelligent thought. I replaced the protruded rectum and packed it with one-quarter pound of sterilized cotton, after which a large wad of cotton was placed directly over the anus, then a piece of cotton rope was tied securely to the tail and the tail drawn as tightly as possible directly between the hind legs, the end of the rope being tied over the neck like a collar.

I took another walk around the block and a fresh cigar, then back to the mule for inspection and examination. Everything was in place as I left it, and I had fresh hopes. I could see a check for $150 in payment for this mule, and my hopes rose. Another walk for a half hour and a return to the mule. Everything pretty. Then to bed.

The rope was cut in the morning and the cotton pack removed. The rectum remained in position, but the mule was noticed to have bowel movements every fifteen or twenty minutes for five or six days thereafter.

Now, as to the probable cause of the condition. These mules are in transit for thirty-six hours, after which they are unloaded for feed and water, and then reloaded for further transportation. Since they have to stand in a crowded car for a protracted length of time, their bodily resistance is lowered, and then when they have access to feed and water, they naturally gorge themselves, in which condition they are again loaded and the journey continued, resulting in a further diminution of the bodily resistance with a consequent disturbance of the intestinal tract.

The thought presents itself that tamponing with large amounts of dry sterilized absorbent cotton might be indicated in the retention of replaced uteri where the straining persists.

Waynesboro, Miss. G. E. Ellis

NUTTALL'S DEATH CAMAS POISONOUS TO CATTLE AND SHEEP

Definite information concerning Nuttall's death camas as a plant poisonous to livestock has been secured by the United States Department of Agriculture by experimental study. Very little had been known of the poisonous properties of the plant prior to the study which began in 1923. In the spring of that year, a representative of the department visited Osage County, Oklahoma, where cattle losses due to the plant had been reported, and gathered samples of the species which was found growing in considerable abundance.

In the experimental study which followed, the plant was fed to 7 cattle and 16 sheep. All but one of the animals were more or less affected by the plant and two died. The results of the investigation are reported in Department Bulletin No. 1376, just issued by the department.

The plant is described as having stout stems, 1 to 2 feet high; leaves from 4 to 20 inches long, one-fourth to three-fourths inch wide, and somewhat curved. The whitish or yellowish flowers are in clusters. The known range of the plant is in the upland prairie from Riley County, Kansas, south to the southern limits of Edwards Plateau, Texas.

As with other forms of death camas, there is no effective medicinal remedy known. The plant, so far as known, grows in somewhat limited areas, so that stockmen who recognize the danger can, by proper care, keep their animals away from these areas during the dangerous period. The plant comes up before the grasses and is said to disappear in a few weeks' time. It is easily recognized, and, for the most part, can be avoided.

Although animals may be poisoned by eating the plant, it does not necessarily follow that they will die; a large proportion will probably recover. It is important that sick animals should be kept quiet and fed if they show a desire to eat. It is possible that some laxative like linseed oil would aid in the elimination of the poison.

A copy of the bulletin can be secured, as long as the supply lasts, by writing to the United States Department of Agriculture, Washington, D. C.

HOG CHOLERA

A chicken fancier, who also owned a few hogs, was grinding up hog skulls for green bone for his poultry. Some small shotes that had the run of the place frequently shared this delicacy with the fowls, but obtained something besides egg-forming material.

A certain farmer was advised that a diagnosis of hog cholera had been made on his neighbor's hogs. However, he did not concur in the decision and permitted his swine to mix with the infected hogs. His "knowing more than the veterinarian" was responsible for the loss of 100 per cent of his herd.

A certain party who would not think of hauling and feeding garbage to his hogs was much pleased at the feed he was saving by permitting the animals to run to a nearby public dump. With most of the animals dead, he is now convinced that a hog gets something besides food at such places.

Judge H. C. Germ "soaked" several farmers quite heavily for buying hogs and bringing them into the state without a permit. These parties thought they were getting some cheap hogs and were not interested in complying with the state law, which requires vaccination of the animals. There is no appeal from the decision of the Judge, as the execution has been carried out and the loss is total. The penalty for "bootlegging" sick hogs is apparently heavier than for indulging in other forms of this vocation.

We used to think that a red neck-tie was about the worst present that Santa Claus could bring. However, we have changed our mind. Last Christmas a farmer in a neighboring state gave a Maryland friend a sow and litter of pigs and in a few days the animals were dying with cholera. Unlike Mrs. Gotrox with her latest operation, he kept the matter a secret, and even went so far as to borrow a hog from a neighbor and return it without advising the owner that his animals were ill. Some Christmas present, and a high degree of cooperation!

College Park, Md. I. K. Atherton

SHIPPING FEVER (INFLUENZA) OF HORSES AND MULES

What do we know about shipping fever of mules and its various manifestations? What causes at least one out of every carload of mules and horses shipped from the great livestock centers to the interior to develop pneumonia and die?

Why will some develop purpura and others remain apparently well?

What causes the eyes of some to cloud up and finally go blind?

What causes the animals to "go bobby" or drag their hind legs and feet after having been shipped and contracted influenza?

What causes them following shipment to contract a violent diarrhea that the usual remedies fail to check?

What causes them to get "windy" following shipment?

These questions are asked merely to mention some of the complications that may and do arise following influenza. In the words of the shipper, one may look for anything following this epizootic in horses and mules. A discussion of these questions by practitioners through the pages of Veterinary Medicine would be appreciated.

G. E. Ellis

Waynesboro, Miss.

SWANS MATE FOR LIFE

The presence of one or more pairs of swans lends great charm to any suitable body of water in a public park or on a large estate. The Biological Survey of the United States Department of Agriculture, which offers this suggestion, adds that swans are slow to mate, but that they remain mated permanently, and that the only satisfactory way to buy breeding stock, therefore, is in guaranteed mated pairs.

Wild swans may not be captured, confined, bought, sold, or shipped for propagating purposes without permit from the United States Department of Agriculture. The Biological Survey will furnish a list of dealers from whom pairs may be purchased, and information on their habits and care. Swans are large and aggressive birds, and must be given plenty of space. Different pairs fight constantly, and if the available range is not large enough for pairs to separate when they choose, an ample pen should be wired off for each pair. The birds can not keep in good condition without access to a body of water, and it is desirable that this should be large enough to maintain plant growth for natural roughage.

Swans graze, but not so extensively as geese. Grass, clover, and alfalfa, as well as water plants, are suitable green foods. Grain is also needed. In the Northern States swans can winter in a shelter open to the south and littered with plenty of hay or straw to protect their feet. Where their swimming pool does not freeze over, no winter shelter is needed.

POSTMORTEM EXAMINATION REVEALS RESULTS OF PERICARDITIS OPERATION

In the February issue I had a report on an operation for traumatic pericarditis, and I am now able to write the last chapter of the case as far as the cow is concerned.

Last February I was called by this same client to come as quickly as possible to attend a cow which had "cast her withers" as he termed it. When I arrived I recognized my patient as the one I had operated on for traumatic pericarditis some months before. This time she was in a very serious condition; in fact, she died before I could get started to relieve the trouble.

With the owner's permission, I held a postmortem examination on the animal for the purpose of finding out just how much damage the foreign body and my operation had done.

The rumen was attached to the side of the abdominal wall where I had made my first incision. The anterior wall of the reticulum was in some places one-half inch thick and adhered to the diaphragm, while between the two was an abscess about the size of a basefall full of creamy pus.

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The pericardium was not normal, but it is difficult to explain just what it was like—a little paler than ordinary, noticeably larger and seeming to have lost some of its tone.

The heart appeared normal except for about twenty light colored marks on its posterior surface. I took these to be scars.

I had expected to find more adhesions. This was interesting to me and I thought it would be to others also. The cow apparently had made a complete recovery from the pericarditis operation and was in good flesh when she freshened.

H. J. Davis

Aylmer, Ontario

The following gives the approximate incubation periods of the eggs of fowls:

Hen	21 days
Peafowl	28 days
Duck	28 days
Goose	30 days
Guinea	25 days
Pigeon	18 days
Pheasant	25 days

Although sunshine has been suspected to be of some value in the conservation of health of man and animals the real significance of exposure to sunshine was not realized until the discovery that ultra-violet rays are filtered out by glass and by smoke. Therefore, the dwellers in the smoky cities are deprived of one of the essentials of health. It has been demonstrated that milk from cows that are exposed to ultra-violet rays has greater anti-rachitic property (Vitamine D) than the milk from cows that have not been irradiated; and the eggs produced by hens that have been irradiated have greater anti-rachitic property than the eggs from hens that have not been so treated.

It is evident that photo-therapy when indicated and properly applied is a valuable adjunct in medicine. There should be some means of standardizing of this valuable therapeutic agent in order that it may be more extensively used.

According to reports a large percentage of the cases of rickets are due directly to insufficient sunshine (ultra violet rays) or indirectly to foods that have been deprived of proper exposure to ultra-violet rays during their development.

There is at least one condition in which ultra-violet rays produces a violent reaction. It is a condition affecting the human and is characterized by the formation and deposit of porphyrin a pigment. Porphyrin is closely allied to hemoglobin. This condition is manifested by a purplish color of the teeth and a hypersensitiveness of the skin to sunshine. People so affected find it necessary to wear heavy veils and gloves.

MILK BREAD RICH IN TASTE AND FOOD VALUE

There is a world of difference in the sound and in the taste of bread and milk and bread and water. Judged in several ways, there is a similar difference between bread made with milk and bread made with water.

Milk and wheat are an excellent food combination whether they are mixed before or after baking. The milk supplies food materials that the wheat lacks, and vice versa. Milk, for instance, happens to be particularly rich in calcium, while wheat contains very little. Calcium is a mineral that the body needs constantly for building and repairing bones, teeth, and other tissues. Unfortunately the average American diet is often rather low in calcium. Milk bread is therefore one way of giving the body a more generous supply of this valuable mineral. Bread made with milk also tastes richer and does not grow stale so rapidly as when water is used in mixing the dough.

When these facts were laid before the commercial bakers by their research department several years ago, many of them at once adopted a milk-bread formula. Consequently every year more of the loaves turned out by the commercial bakeshops are made with at least some milk. To be sold as milk bread, at least one-third of the liquid used in mixing the dough must be milk, according to the standards of the United States Department of Agriculture. Homemade bread can practically always be all-milk bread, the department suggests in its new bulletin for home bakers. If fresh milk is not available, evaporated or dried milk can be used with good effect by the home maker who bakes the family bread supply.